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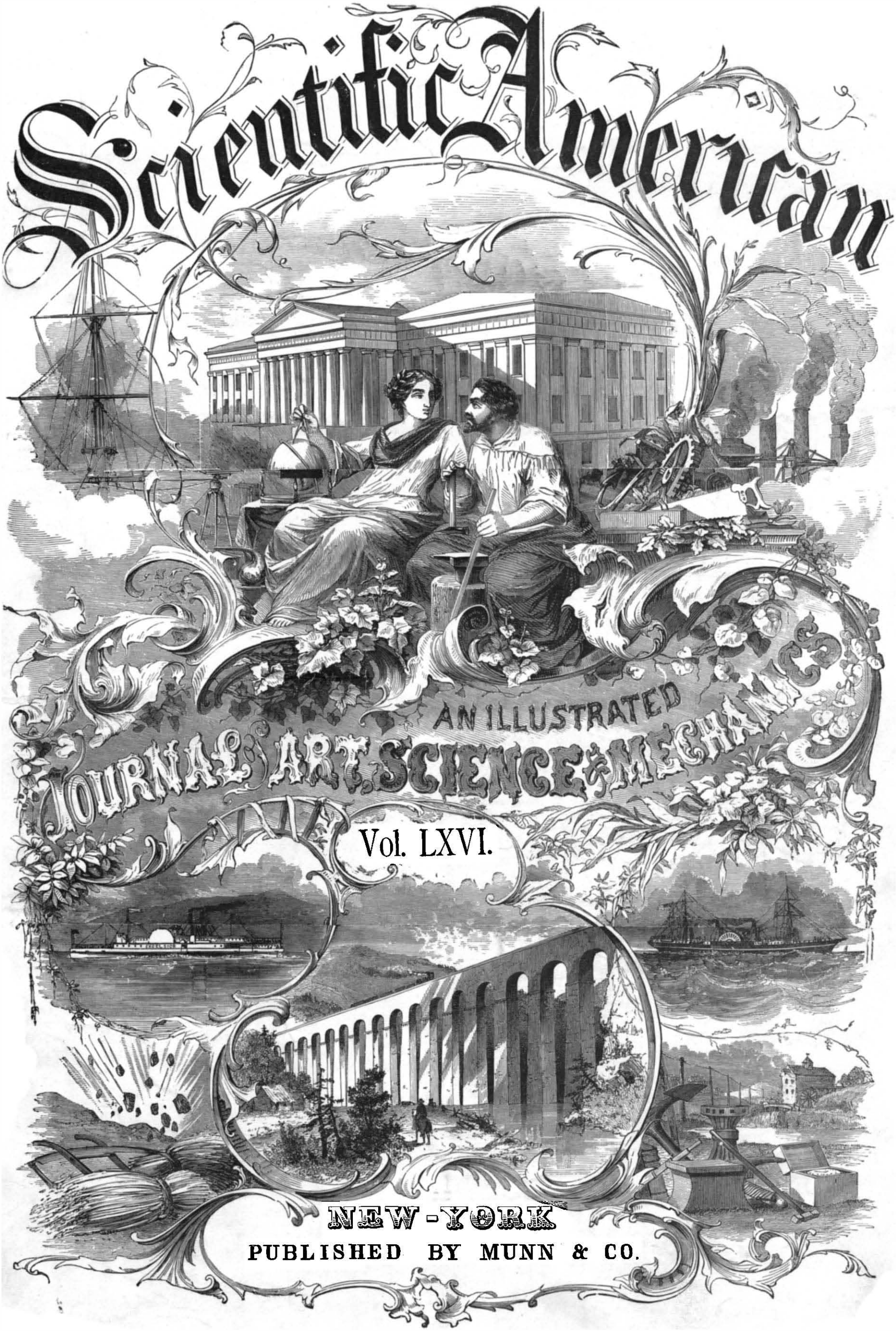

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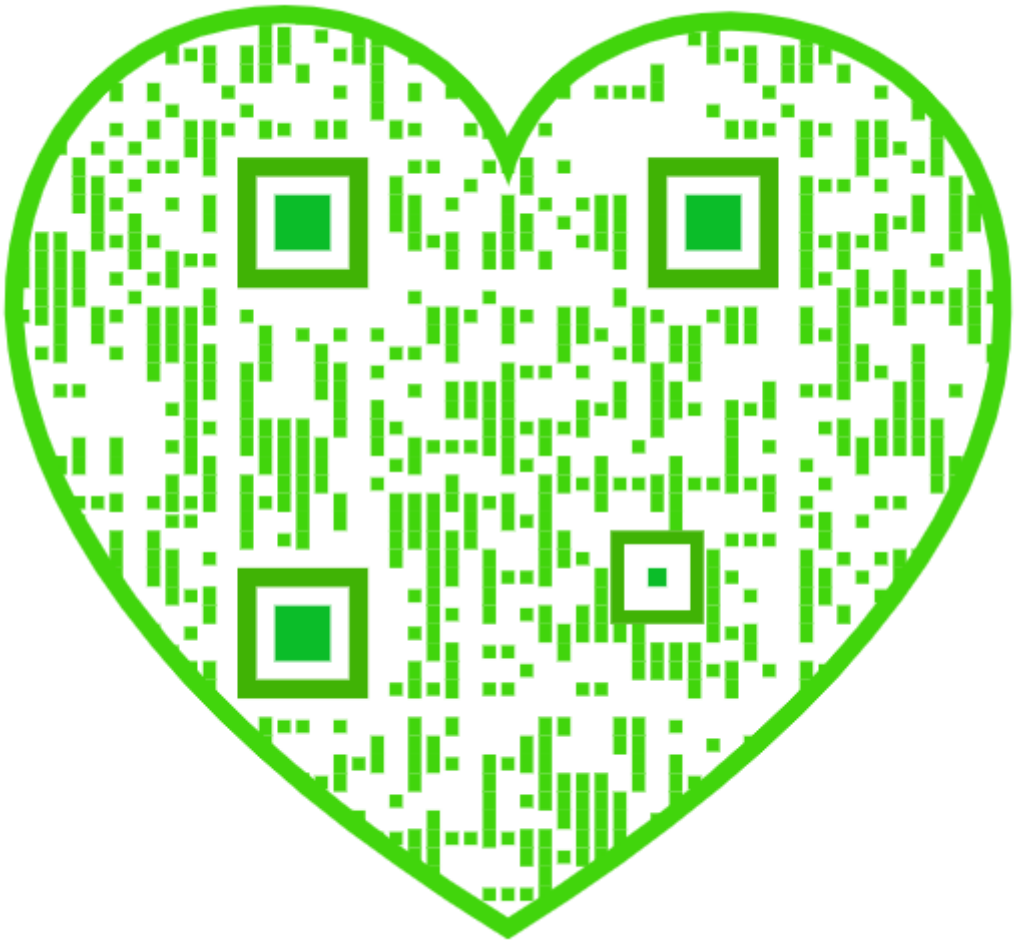

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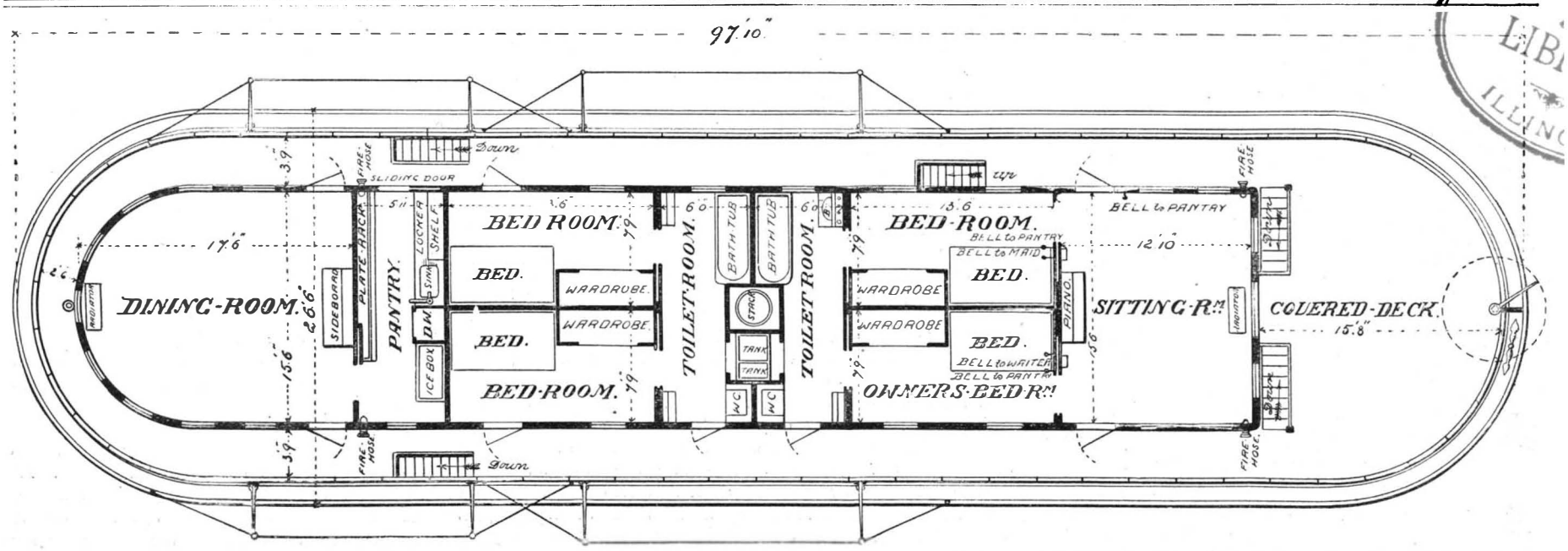

THE LORILLARD HOUSE BOAT CAIMAN, A LUXURIOUS PLEASURE CRAFT.—[See page 7.]

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DEMAND FOR SAILING VESSELS INCREASING.

The demand for sailing vessels has, of late, shown a marked increase both here and abroad; in Great Britain, according to *Lloyd's Registry*, there being now 141 such craft with a total tonnage of 185,807 under construction against 76 with a tonnage of 80,000 this time last year. Here about the same tendency is manifest. The rate of steamer construction in Great Britain has seen a marked falling off during the year, and though in these waters the rate has largely increased, it may easily be traced to favorable legislation rather than to a further abandonment of the sailing type. Shipping people, it would seem, are beginning to discover that for certain classes of trade, in which time is not a very material element, the sail is more economical than the steam engine; the price of fuel, too, is telling against the latter. Then, again, the difference in cost of construction between steamer and sailing vessel, when compared with the amount of saving in time in average voyaging of the ordinary steam tramper over the sailer, inclines to favor the latter.

The steam tramp, it will be found, will not average much above ten knots, under favorable conditions; to push her at higher speed would largely increase her sailing expenses, while against heavy head seas she will not do so well by two or three knots. The smart sailer, on the other hand, though falling far short of this figure with winds heading her off, is good for much more than ten knots under favorable conditions of wind and sea. With the old-time clipper ships sixteen knots an hour, and even more that, was not unusual with favorable gales over their counters. The clipper ship Great Republic, built by Donald McKay, when employed as a transport for French troops in the Crimean war, to the surprise of all led off in ordinary weather the steam vessels of the fleet that were to have taken her in tow.

In 1851 the Flying Cloud (clipper) made the passage from New York to San Francisco, her track computed at 17,000 miles, in 89 days 21 hours. Her greatest distance from noon to noon of any day was 374 knots (433¼ statute miles), which, allowing for difference in longitude, was made in 24 hours 19 minutes 4 seconds, or at the rate of 17·77 miles per hour. In 1853 the Comet reached New York from San Francisco in 83 days, and the Sovereign of the Seas from the Sandwich Islands in 82 days. The greatest distance made by the latter from noon to noon on any day (in this case 23 hours 2 minutes 4 seconds) was 362 knots (419 miles), or at the rate of 17·88 miles per hour.

As to the number of men required to work a full-rigged ship (steam winches being employed), it is not so great, when tonnage is compared, as is necessary to a steamer—deck hands, stokers, and engine-room crew; and when we consider the type known as the "tern," or three-masted schooner, the saving in wages is very marked, for, with the use of the steam winch for heavy hauling, a crew of six or seven men can work a craft of 1,200 tons.

ELI WHITNEY AND ELI WHITNEY BLAKE.

The citizens of Augusta, Georgia, are about to erect a monument in that city to the memory of Eli Whitney the inventor of the cotton gin, as a grateful testimonial from the people of the Southern States to the man to whom they owe the principal part of their prosperity. The purpose is a noble one, and the honor will be worthily conferred. Mr. Whitney's invention was of conspicuous benefit to this country and to all mankind, not only as the creator of wealth, through its development of great agricultural and manufacturing industries connected with cotton, but by its cheapening and consequent greater diffusion of all fabrics of that material, whereby the comfort and the progress of the human race have been greatly promoted. It was also specially meritorious as the embodiment of an original idea or principle of operation in a form practically perfect, for the cotton gin remains to-day substantially the same as it came from the hands of its inventor.

It is somewhat remarkable that Mr. Whitney's name should have become connected in later times with another mechanical invention of even a greater economic value than the cotton gin from its wider range of use, and of equal merit as an original and complete invention. We refer to the stone and ore crusher of Eli Whitney Blake, a nephew of Mr. Whitney, which was first introduced to public attention by an illustrated article in the SCIENTIFIC AMERICAN, September 4, 1858. Since that date, "the Blake crusher" has become as famous and as indispensable in engineering and mining work as the cotton gin is to the cotton grower. The function which it performs, that of breaking stone into fragments without pulverization, is like that of the cotton gin, one which was before performed only by hand and on the smallest scale; but unlike the cotton gin its utility is not limited to special regions and a single branch of industry. In every part of the world, from Alaska to Patagonia and from Norway to New Zealand, thousands of the machines are in use crushing ores in every description of mine, thousands more in constructing streets and highways and ballasting railroads, and other thousands in breaking stone for concrete foundations of buildings, bridges, aqueducts and other public works. Like the cotton gin also, but to a greater and more diversified extent, it has developed and advanced the various forms of industry to which it is applicable by furnishing a better product than that of hand labor, and so suggesting better methods and securing better final results than hand labor, however abundant and cheap, could ever have made attainable.

While the beneficial results and economic value direct and indirect of the Blake crusher, like those of the cotton gin, are incalculable, a similar experience attended its history as a patented invention. Persistent infringements on the largest scale pursued the course of both and robbed their authors of all but an insignificant reward for their services to mankind. Both inventors were born in the little town of Westboro, Massachusetts, also both were residents in later life of New Haven, Connecticut, in whose cemetery both lie buried.

POSITION OF THE PLANETS IN JANUARY.

VENUS

is evening star. She is coming into fine position for observation in the early evening, and may be found shining serenely in the southwest for nearly two hours after sunset, on the first of the month, and for nearly two hours and a half when the month closes. She is the most interesting feature of the starlit sphere as long as she is above the horizon, for her radiance and size are increasing as she approaches the earth, and give a charming foretaste of what may be expected in time to come.

When Venus was in superior conjunction with the sun on September 18, her whole illumined disk was turned toward the earth, like a small full moon. As she advances in her course eastward from the sun, she takes on the gibbous phase, and, when January closes, only 0.843 of her disk is illumined. When in superior conjunction, the brilliancy of her disk was represented by 47.4. When the present month closes, it will be represented by 66.6. In like manner, her diameter has increased from 10″.0 to 12″.8. Every one should study the present movements of this peerless star, for the interest it arouses and the enjoyment of the celestial picture.

The moon makes two conjunctions with Venus in January. The two-days-old crescent is in conjunction with Venus on the 1st at 9 h. 32 m. P. M., being 3° 17′ south. Crescent and star will be below the horizon at the time of the conjunction, but will be fair to see on the twilight sky as they approach each other. The two-days-and-a-half-old crescent will be in conjunction with Venus on the 31st at 6 h. 34 m. P. M., being 3° 42′ south. Moon and star are visible at the time of the conjunction, and, if the weather be propitious, the celestial picture will find many admirers.

The right ascension of Venus on the 1st is 20 h. 38 m., her declination is 20° 14′ south, her diameter is 11″.6, and she is in the constellation Capricornus.

Venus sets on the 1st at 6 h. 36 m. P. M. On the 31st she sets at 7 h. 50 m. P. M.

JUPITER

is evening star. We are soon to lose his brilliant presence from the sky, and he can now be observed only in the early hours of the evening. The feature of the month will be the approach of the bright stars Venus and Jupiter. As the former is moving eastward from the sun, and the latter is moving westward toward the sun, the space between them must lessen. The planets are about 36° apart on the 1st and only 5½° apart on the 31st.

The moon is in conjunction with Jupiter on the 4th, at 11 h. 8 m. A. M. being, 4° 2′ south.

The right ascension of Jupiter on the 1st is 23 h. 1 m., his declination is 7° 33′ south, his diameter is 35″.4, and he is in the constellation Aquarius.

Jupiter sets on the 1st at 9 h. 47 m. P. M. On the 31st he sets at 8 h. 19 m. P. M.

NEPTUNE

is evening star. He is in fine position for telescopic observation on account of his high meridian altitude, and is easy to find on account of his vicinity to Aldebaran.

The moon is in conjunction with Neptune on the 10th, at 11 h. 41 m. A. M., being 2° 43′ north.

The right ascension of Neptune on the 1st is 4 h. 21 m., his declination is 19° 51′ north, his diameter is 2″.6, and he is in the constellation Taurus.

Neptune sets on the 1st at 4 h. 46 m. A. M. On the 31st he sets at 2 h. 45 m. A. M.

MERCURY

is morning star. He reaches his greatest elongation on the 19th, at 2 h. 58 m. P. M., when he is 24° 16′ west of the sun. He is then visible to the naked eye in the east, before sunrise, but is so low down in the south that it will be difficult to find him, although he rises nearly an hour and a half before the sun.

The right ascension of Mercury on the 1st is 18 h. 5 m., his declination is 20° 15′ south, his diameter is 9″.6, and he is in the constellation Sagittarius.

Mercury rises on the 1st at 6 h. 28 m. A. M. On the 31st he rises at 6 h. 4 m. A. M.

URANUS

is morning star. He is in quadrature on the 26th, at 6 h. A. M., being 90° west of the sun.

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The right ascension of Uranus on the 1st is 14 h. 13 m., his declination is 12° 51′ south, his diameter is 3″.6, and he is in the constellation Virgo.

Uranus rises on the 1st at 2 h. 9 m. A. M. On the 31st he rises at 0 h. 14 m. A M.

SATURN

is morning star. Although Saturn ranks with the morning stars, because he is on the western side of the sun, he will, before the month closes, be a conspicuous object in the evening sky, rising at ten o'clock in the middle of the month, and growing larger and brighter as he approaches the earth. He rises almost due east, and as there are no large stars very near him, may be easily recognized by his serene light.

The moon is in conjunction with Saturn on the 19th, at 5 h. 8 m. A. M., being 1° 57′ north.

The right ascension of Saturn on the 1st is 12 h. 4 m., his declination is 2° 1′ north, his diameter is 17″, and he is in the constellation Virgo.

Saturn rises on the 1st at 11 h. 8 m. P. M. On the 31st he rises at 9 h. 7 m. P. M.

MARS

is morning star. There is nothing noteworthy in his January course, but he will not long remain in his present low rank among his peers.

The moon five days before her change is in conjunction with Mars, on the 24th, at 7 h. 15 m. A. M., being 1° 15′ south. The waning moon may serve as a guide to the ruddy planet.

The right ascension of Mars on the 1st is 14 h. 52 m., his declination is 15° 39′ south, his diameter is 5″, and he is in the constellation Virgo.

Mars rises on the 1st at 3 h. 1 m. A. M. On the 31st he rises at 2 h. 39 m. A. M.

Venus, Jupiter, and Neptune are evening stars at the close of the month. Mercury, Mars, Saturn, and Uranus are morning stars.

Curious Lore in Rings.

L. P. GRATACAP.

The ring has a great antiquity. It became the signet to Joseph of the favor of the great Pharaoh of Egypt, and in the earliest relics of aboriginal culture we find it reproduced in shell, stone, and metal. To-day its shining and colored beauty decorates the fingers of the belle, or in a heavy garniture of gold with jasper, heliotrope, or onyx gives emphasis to the gesture of the responsible plutocrat. Its form and design have varied extremely, and about the ring a host of legends, superstitions and fanciful notions have gathered, which impart to it a new interest. In an old, quaint Latin book of some rarity we have found a wonderful assortment of curious references to rings, and we have extracted from its cramped and crowded pages some entertaining learning. The work is by Fortunius Licetus Genneusis. It was published in 1645, at Udine, in the Venetian States, and is entitled "A Book upon Ancient Rings, in which are explained diligently their many Names, Primeval Origin, multiplex Materials, many Figures, effective Cause, Purposes, or numerous Uses, Differences, excellent Virtues, Magnitudes, Values, Multitude, Gestation, Position, Preservation, their Loss and Recovery, spontaneous Deposition, Tradition, Legacy, Fracture, and Burial with the Dead in ancient times."

In sixty-five chapters this patient chronicler elaborates every possible aspect of his subject. How rings were a badge of servitude, how used in marriage and divorce, for memoranda, for the reward of courage, for seals, how used among thieves, for the exorcism of demons and sickness, as vehicles of poison, for lots, for a note of nobility, for secrets, for keys, for divination, for ornament, for gifts, for natal celebration, for the expression of gratitude, honor, piety, hospitality, etc., for dials, of their size, value, number, and uses. As to their origin, our laborious author ascribes their first use to rings in chains, and secondly their use upon the fingers of faithful slaves as an evidence of fidelity, from which their natural uses as marks of nobility, of love, and friendship were derived. Among the ancients, a great many substances were devoted to the making of rings—metals, stones, bones, horn, wood, glass, amber, and almost all hard substances figured among these, and later combinations of metals of much ingenuity were devised.

There were medical rings, to which strange powers were ascribed, as curing the bites of serpents, overcoming poisons, expelling sickness, and driving away pestilence. Honest Genneusis feels some natural misgivings over these remakable traditions, and suggests that the rings possessing these strange powers were filled in their cavities with efficacious powders, which came in contact with the veins of the afflicted sufferers when placed upon their fingers. He seems, however, to place credence in an ancient story that a ring made of a nail which had fastened a shoe to the left hind foot of a horse was valuable in rheumatic disorders. Diseases of the head and epilepsy yielded to the singular virtues of especially prepared rings, and it was curiously explained that this efficacy arose from the fact that the ring placed upon the ring finger came in contact with a nerve or vein coming straight from the heart, which, as the fountain of life, might thus easily be influenced by the ring's medicinal power. They were of the opinion that a ring made from the teeth of a sea horse (?) would cure hemorrhoids, a view of the subject which may interest our medical faculties to-day. Rings were constructed in those ancient days, when death was inflicted more ingeniously than now, which, when broken in the mouth, discharged a poison by which either involuntary or voluntary death was secured. In ancient rings known as talismans, certain unknown letters were inscribed and images in gems, and those who wore them were regarded as invulnerable and lucky. Their inscriptions and figures related to celestial occurrences, and were connected with the horoscopes and astronomical interpretations of men's destinies.

All of these sink, however, into insignificance before those remarkable gemmed rings which, by turning hither and thither, bestowed invisibility upon their owners—a virtue which our author fervently ascribes to the "efficacy of a malevolent devil." To other rings of this character the power was assigned of enabling men to fly and to regain their youth. A prescription for a ring, discovered in this book, is of striking interest as a reflection of a curiously superstitious age. It is this: "For epilepsy make a ring of gold, in which are included parts of the umbilical cord of a newly born boy, hairs of a white dog, a little of the root of peony. Place over it a pearl, and engrave about it this legend, 'Gaspar brought myrrh, Melchior frankincense, Balthasar gold.'"

Rings were used in abundance by the ancients. We are told how three rings were worn on the little finger, and sometimes the fingers were so covered as to appear like gold throughout their lengths, while gems of much beauty were added. Sometimes these latter were used uncut, while the fashion at times prevailed of not wearing gems, and swells loaded themselves with gold rings only. The ancients were addicted to the use of enormous rings. It is related of Julius Cæsar that while he harangued his troops the immense ring on his finger could be seen at a distance which his voice could not reach. So formidable were some of these rings that if of iron they served as weapons of assault, and Aristotle discusses the question whether an injury inflicted by the blow of such a ring was contemplated as a misdemeanor by the law prohibiting assault. Rings were also made which were supposed to possess the power of arresting evil influences, fascination, and malevolent agencies. These peculiar influences were regarded as emanations from the eyes in a large degree, and the sudden presentation of these strange rings, with their strange devices, arrested the attention and gaze of the evil-minded, and diverted their minds with amusement, so that the "turbulent humours" were allayed and the "rabid temper" soothed. At Rome the patricians wore golden rings, which distinguished them from the slaves, plebeians, and common soldiers, who were, however, permitted to wear rings of iron. Golden rings were at a later date permitted to the slaves and people, and the nobles were thrown into such disgust by this concession as to discard the use of their golden rings, which were no longer an emblem of rank. A peculiar use of rings is instanced where in a certain city a rivalry for the entertainment of visitors arose among its citizens. So fierce became this generous emulation as to lead to open brawls and struggles. To avert these, iron rings were placed about a column in the center of the town, and those reaching this hospitable community took up a ring and sought his home at the house of the family whose ring he had picked up.

Agate in rings warmed the sight, killed poison, and added strength; carnelian stopped hemorrhage, softened anger, and cooled the system; but onyx raised wrath, bad dreams, and agitated the mind. The ancients engraved in their rings the faces of those they loved or venerated, and frequently placed in them the especial emblems they admired. It would be difficult to exhaust the mass of legends, fancies, and varied uses which have been associated with rings, and these few paragraphs will show how ancient and valuable the ring is if only as an interesting relic of long buried habits and notions.

Fiber Cleaning Machines in the Bahamas.

REPORT BY CONSUL THOS. J. MC LAIN, OF NASSAU, TO THE STATE DEPARTMENT.

The development of the fiber industry in this colony, concerning which I have made several reports to the department, has already necessitated the introduction of machines for separating the fiber from the leaf of the sisal, or pita, plant; and the demand for other machines in the future will be very great.

The machines heretofore in use are of English manufacture principally, and they do not seem to have satisfactorily met the requirements of the case. In using these machines the leaf is presented to a scraping wheel, which removes the pulp, gum, etc., from about three-fourths the length of the leaf, leaving the fiber cleaned from that portion. The leaf is then withdrawn, and the other end is presented to the wheel and cleaned in the same manner. The cleaning of each leaf thus requires two handlings by the operator, making the entire process tedious and expensive. The method is unsatisfactory, and persons interested have been looking for something better in this line.

During the month of June, 1891, two Americans arrived in the colony, bringing with them and introducing a new automatic fiber cleaning machine. These gentlemen were Messrs. T. Albee Smith, of Baltimore, and W. A. Keene, of St. Louis, the former being the patentee of the machine. It was announced that on the 25th of June the public would be invited to witness the operation of the machine; and on that day a large number of persons interested in the fiber industry were present, including representatives from many of the out islands, where the largest plantations are being cultivated. Considerable difficulty was experienced in getting the machine running to good advantage, owing to the fact that the somewhat old steam plant used was defective, and the pulleys and belts were not of proper size, width, etc. But, despite these drawbacks, the operation of the machine was decidedly satisfactory, and nearly all present were of the opinion that, under proper conditions, the machine would easily do all that was claimed for it, and that it was a most valuable improvement over all other machines in use in the colony.

The new machine is entirely automatic. It grips the leaves continuously as fast as the operators can supply them, holds them firmly during the operation of cleaning, and delivers the fiber, completely and beautifully cleaned, at the reverse side. No reversing of the leaves or any part of the machinery is required. The operator simply supplies the leaves, and the machine does all the rest. It works smoothly, easily, and rapidly. Its capacity is enormous. One of the hand machines heretofore used here will clean about 3,000 leaves in 10 hours, extracting 180 pounds of fiber; this automatic machine is said to be capable of cleaning 50,000 leaves per day, extracting therefrom 3,000 pounds of fiber. Skilled labor is not required to use the machine; an engine of 8 horse power will furnish all the motive required to run it at full speed. It is not a complicated affair, nor easy to get out of order. Its weight is about 6,000 pounds.

The exhibition may be said to have been very satisfactory to all concerned, and so well pleased were those who witnessed the operation that a number of prominent producers and shippers of the fiber joined in a very flattering testimonial to Messrs. Smith and Keene.

As the sisal plantations are mostly new and cannot come into general bearing under two or three years hence, this ingenious machine, on account of its enormous capacity, can scarcely be used with advantage in this colony at present; but in countries where the supply of leaves is ample it will doubtless be rapidly and extensively introduced.

New West Indian Cable.

The Bahama Islands are soon to be connected with the general telegraphic system of Great Britain and the world. A submarine cable about 200 miles long will be laid from a point about five miles from Nassau, New Providence, to a point about the same distance from Jupiter Inlet, on the southeast coast of Florida. The cable has been designed for the government of the colony by Mr. W. H. Preece. It will be insulated with gutta percha, and is being manufactured by Messrs. W. T. Henley & Co. It will be laid in January or February next by the steamer Westmeath, belonging to that firm. As the Western Union Telegraphic Company's Floridan lines do not at present run so far south as Jupiter Inlet, the station at the American terminus of the cable will be in charge of the officers of the United States Weather Bureau, who will transmit the messages to the Western Union Company's system over their private line. Traffic between England and the Bahamas will thus pass through the Atlantic cables.

Natural Gas at Stockton, Cal.

A San Francisco paper thus notes the natural gas furor at Stockton, Cal.:

There are eight flowing wells about the city, and the company managing most of these has mains in all the principal streets. The wells vary in depth from 1,000 feet to 2,300 feet, and the flow varies much as the depth. One of them in the northern part of the city has an estimated flow of 20,000 feet in twenty-four hours.

All the principal business houses, hundreds of dwellings, the magnificent new five story granite Court House and the Yosemite Hotel are lighted and heated by this force from nature's laboratory. It is cheap and clean, and housewives are delighted. The estimated cost of supplying a kitchen range and stoves in two other rooms, besides lighting a house of nine rooms, is $5 a month. Some of the householders have little stoves that they move about from room to room. There is much more heat to it than to coal gas, and there is little or no soot. A big stove in the Yosemite Hotel dining room has no chimney. A small pipe leads up from the floor, and all the head waiter has to do to warm the big room is to strike a match and light the stove. The development and management of this product is a thing that proud Stockton folks feel is bound to boom their city for manufactures, and it has already done so to some extent. Several more wells are projected.

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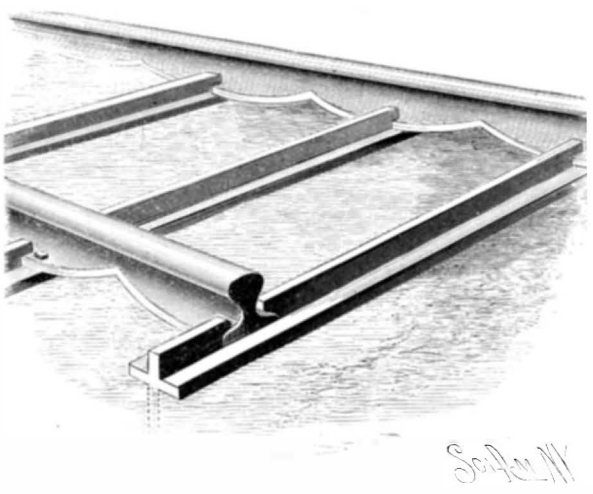
AN IMPROVED RAILROAD RAIL, SLEEPER AND RAIL FASTENER.

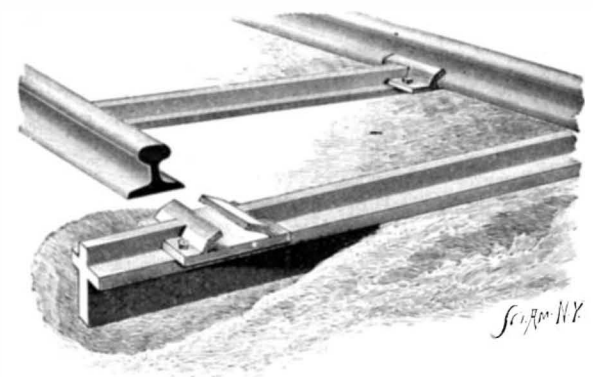
The novel form of railroad rail shown in the illustration is designed to be easily attached to a sleeper and be held in such a manner that it cannot work loose. The rail is like the ordinary rail, except that its flange has scalloped edges, the width of which, at the widest portions, corresponds to the width of slots in a raised longitudinal rib on the upper side of the sleepers, in combination with which this rail is designed to be used. When the wide portion of the rail flange is in the slot the rail cannot be moved laterally, and the ribs of the



GLYNN'S RAILROAD RAIL.

sleepers overlap the rail flange and prevent vertical motion. To prevent the rail from creeping, a spike may be passed through a perforation in the flange into a corresponding hole in the sleeper, at such intervals as may be desired.

This rail, and the sleeper and clamp for use with rails of the ordinary pattern, shown in another illustration, form the subject of two patents issued to Mr. Michael A. Glynn, of No. 8 Calle San Ignacio, Havana, Cuba. The sleeper has a depending tongue to be embedded in the earth, a broad portion to rest upon the surface, and a central longitudinal rib on its top, slotted near each



GLYNN'S RAILROAD SLEEPER AND CLAMP.

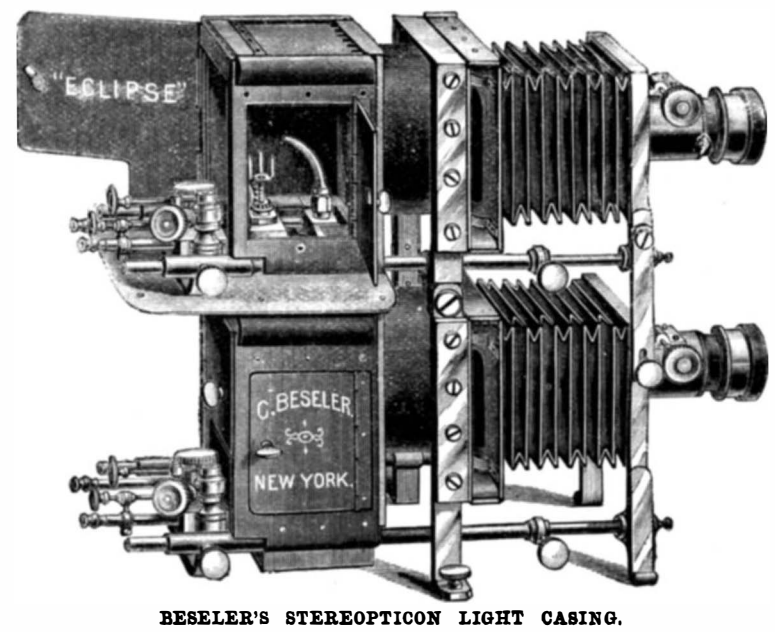
end to receive chairs which carry the rails. The shape of the slots corresponds to that of the chairs, and the latter fit closely upon the rails. The chairs are slipped into the slots from the side, so that the chairs and rails cannot have a vertical movement, and it will be impossible for the rails to have any lateral movement. The sleepers and chairs are of simple construction and may easily be placed in position.

A COMPACT STEREOPTICON.

The popularity of the dissolving stereopticon has led inventors to devise various forms capable of being stored in a small space, and at the same time light, portable and adapted to quick and easy adjustment.

In a double lantern where one is placed above the other, as shown in our illustration, the difficulty has been to so arrange the ventilation as to prevent the overheating of the upper lantern and yet have it very compact, and comparatively light-tight.

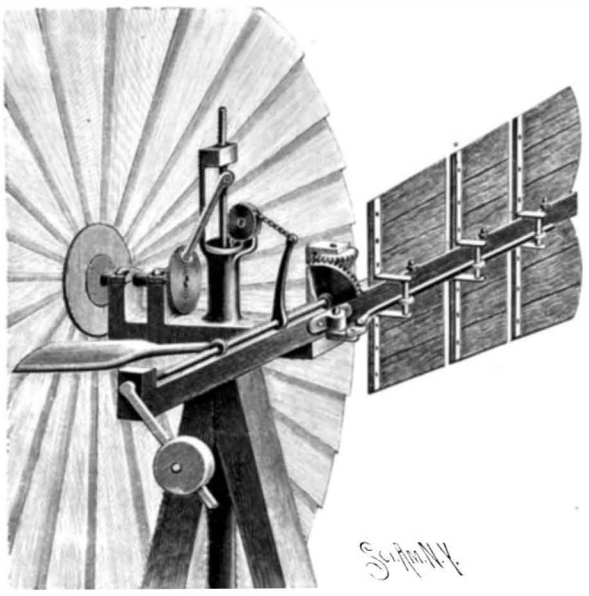
In the case of the present invention, this is accomplished by a simple yet ingenious way of protecting the heat outlets arranged around the top and sides of the casing, by peculiar shaped angle plates, so formed as to direct the escaping heat and reflected light rearward. Any extraneous light is thus prevented from striking the ceiling, the screen, or emerging from the side to the annoyance of the operator. A sheet of asbestos felting is placed between the two lanterns, but does not affect the easy ventilation of the lower one. The light-tight casing is movable on the rods, and when the lantern is set up, is drawn back as shown in the engraving, which exposes the condenser and places it outside of the casing, thereby preventing it from sweating or becoming overheated. There are simple but convenient adjustments of the lime carrier, and jets and extra flange rings are provided for the quick replacing of lenses of different foci, according to the size of picture desired. A bellows in front of the slide carrier prevents the escape of light. The whole apparatus is packed in a neat leather-covered box and weighs but a little over thirty pounds. The light-tight casing has been recently patented by Mr. Charles Beseler, the manufacturer, No. 218 Center Street, New York, from whom further particulars may be obtained.



BESELER'S STEREOPTICON LIGHT CASING.

AN IMPROVED WINDMILL.

The illustration represents a windmill in which the vane is designed to throw the wheel out in a moderate wind or in a gale, as desired, the turn table being carefully balanced upon the tower and the parts of the mill made so light and perfect in action that it can be

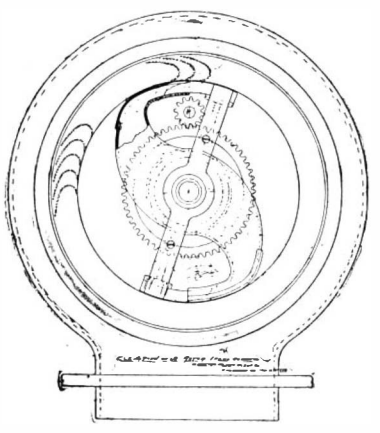


EVARTS' WINDMILL.

stopped or started with very slight effort. The improvement has been patented by Mr. Frank H. Evarts, of Arlington, Kansas. The turn table has two opposite horizontal arms and a vertical tubular extension, above which is supported a guide strap in which the pump rod moves, connected with the wheel shaft by the usual crank disk and pitman. Upon the other end of the turn table arm, opposite the wind wheel, is secured the body bar of the vane, the end of which extends beyond the edge of the wind wheel, and on this portion of the vane are pivoted vertical plates, which may be separated and made to stand at a right angle to the axis of the stem, or closed, to stand parallel with it. Each blade has on its outer face a yoke, all of the yokes being connected with a pitman, and the latter is connected by a link with a horizontal crank arm on the lower end of a short shaft, journaled in the body bar, the upper end of this shaft having a bevel pinion meshing with a segmental bevel gear on a line shaft journaled on the stem or body bar. On the outer end of this shaft is an arm, on which is held an adjustable weight, a fan being also secured to the shaft, and a curved arm, a chain or cable attached to the upper end of the latter leading over a guide pulley and down through the tubular casting of the turn table, to within convenient reach of the operator, affording means for stopping or starting the windmill, or throwing the wheel into or out of the wind. When the blades on the vane are closed, the fan assumes a position at one side of the wheel shaft, as shown, and presents its full face to the wind when the edge of the wheel is so presented; but when the blades are open, the fan is in a vertical position. When the cable is loosened at its lower end, the weight turns the line shaft and brings the fan to vertical position, and the wheel is swung into position to be driven by the wind. The weight may be so adjusted as to require a moderate or a high wind to blow the fan down to a horizontal position, when the wheel will be swung around so as to present its edge, and the mill will be stopped. If the wind has not sufficient force to blow the fan entirely down, only partially closing the blades, the speed of the wheel will be slackened, but it will not be stopped.

AN IMPROVED WATER MOTOR.

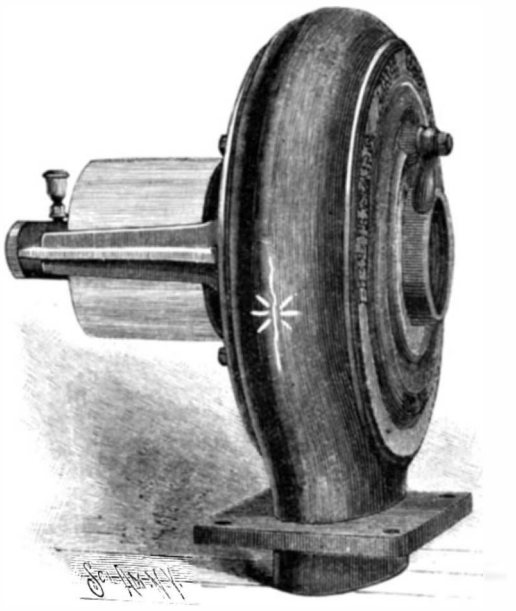
Some important improvements have recently been embodied in the construction of the well known Little Giant water motor, a simple, serviceable, and powerful machine, of which large numbers are in use. It is built on the principle of the turbine, and therefore gives a high degree of efficiency, and the pinion gear is extended to the outside to be operated by a lever for



WATER MOTOR—SECTIONAL VIEW.

the adjustment of the water jets, which are opened and closed at will, the lever being operated by cog gears, as shown in the sectional view. The wheels are made of brass, securely riveted together, the water chute being of composition and the shaft of steel, while the motors have only two bearings, babbitted, to run with the least possible friction.

These motors are used in all sections, and for an almost unlimited variety of purposes. In Mobile, Ala., the Craft & Co. roller mill is using one for grinding corn, making 27 bushels of meal per hour with 85 pounds of water pressure, and two are in use in the Mobile foundry. In Galveston, Texas, 24 of these motors are in use. At Defiance, Ohio, several large size machines are in use, and the Franklin, Ohio, water works light their pumping station with a combined motor and dynamo, the high speed of the motors specially adapting them for running dynamos. The Joliet, Ill., and Independence, Iowa, water works also use it for lighting stations, for which purpose it is likewise used at Pawtucket, R. I., Boston, Lynn, and many other water works stations, a kind of service for which the most efficient machinery is always sought. Many printing offices throughout the country use the



THE BELKNAP LITTLE GIANT WATER MOTOR.

motor to run presses, and it is employed for almost every purpose, from running machine shops, elevators, pumps, etc., to the operating of fans, blowers, and church organs. Further particulars in reference to this efficient motor may be obtained of the Belknap Motor Co., Portland, Me.

Coal from an Artesian Well.

J. H. Baldwin, State Engineer of Irrigation of South Dakota, reports that for the last week the artesian well at Springfield has been throwing up quantities of soft coal and hundreds of pounds of slate. When he left it there had been gathered a ton and a half of soft coal which had been scattered around the well by the force of the stream. The Springfield well is one of the largest in the State, and has a pressure of 200 pounds and throws a stream thirty feet high.

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THE TEXAS RAIN MAKING EXPERIMENTS.

Nearly all the accounts of the recent rain making experiments in Texas appear to have emanated from, or to have been inspired by, persons who took part in the performances. These reports were, in most instances, grossly exaggerated, and, in some cases, wholly destitute of truth. It is refreshing, therefore, to find a published account which bears evidence of independence in its statements and freedom from the control of interested persons.

It is understood that an attempt will be made to induce the present Congress to appropriate more money to carry out another series of these foolish fireworks. For the enlightenment of our law-givers and the entertainment of readers, we give the following illustrated account, for which we are indebted to the *Texas Farm and Ranch:*

Did any of the metropolitan papers, excepting *Texas Farm and Ranch*, of Dallas, and *Farm Implement News*, of Chicago, send a special reporter to the scene of Gen. Dyrenforth's rain making experiments near Midland? This question is asked because numerous papers throughout Texas are circulating reports of these experiments which are directly opposite to the facts as given by *Texas Farm and Ranch* and the *Farm Implement News*. These so-called experiments were made under the supervision of the government and paid for by the people, and the people are entitled to reliable information regarding them.

In order to settle the matter, *Texas Farm and Ranch* will pay one hundred dollars reward for proof that the reports published by it and the *Farm Implement News* were not true in every essential statement, and more accurate and complete than those published in any other paper in or out of Texas, excepting the local papers in the territory surrounding this expensive farce.

Fig. 1.—INFLATING A BALLOON.

Texas Farm and Ranch aims at reliability, and its readers will sustain its reputation in this regard. It could have no possible reason for misrepresenting the rain makers. Its representative was treated in the most gentlemanly manner by Gen. Dyrenforth and the other gentlemen of the party, as well as by Mr. Reynolds, manager of the ranch. He is especially indebted to Prof. Rosell for much information relating to the work of the party, and for theories and opinions on the subject of artificial rain making.

The representative of *Texas Farm and Ranch* was sent to the seat of war to gather facts, and not to ridicule honest effort or boom a theory. This matter of rain making is not one that concerns a few individuals or a party of scientists only, but is one of great public concern, involving in its successful solution giant possibilities for a country capable of sustaining millions of people. The first report of the party's operations appeared in the *Chicago Herald* and other papers about August 13, and gave details of a grand success on the 10th with balloons, kites, and dynamite, which "was followed by a rain of six hours' duration, breaking a drouth of many months." The writer was on the ground on the 14th, and the balloons had not been unpacked, and on that day Prof. Rosell began combining the powders, and Prof. Meyer began loading the canisters which were to be used in generating the oxygen gas. The same day Gen. Dyrenforth stated that the hydrogen tanks would not hold water, and that it would be one or two days before they could be used. The writer examined the tanks, and their condition was as stated by Gen. Dyrenforth.

The first rain that fell in that region after the arrival of Gen. Dyrenforth's party was on the 13th, before any experiment had been made. This writer was so informed by Prof. Rosell and others, and he heard Gen. Dyrenforth make the same statement. But the reporter was not deterred by these facts from reporting a "heavy rain at the ranch in response to the party's efforts." The first attempt to inflate a balloon was made about the 16th. The writer was not present, but was informed on his arrival on the 20th that one of the gasoline furnaces exploded, and that the balloon did not fill satisfactorily, but eventually went up and was exploded by means of a time fuse attached by Prof.

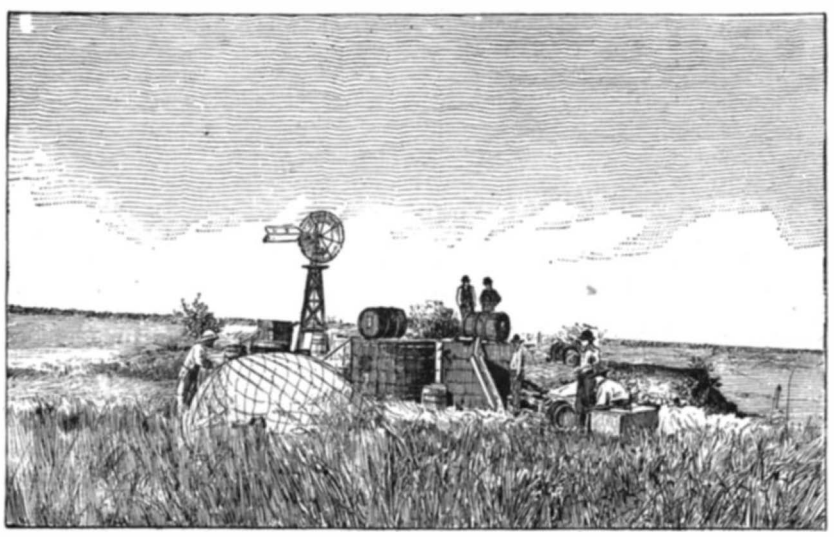

Fig. 2.—BALLOON PARTLY FILLED.

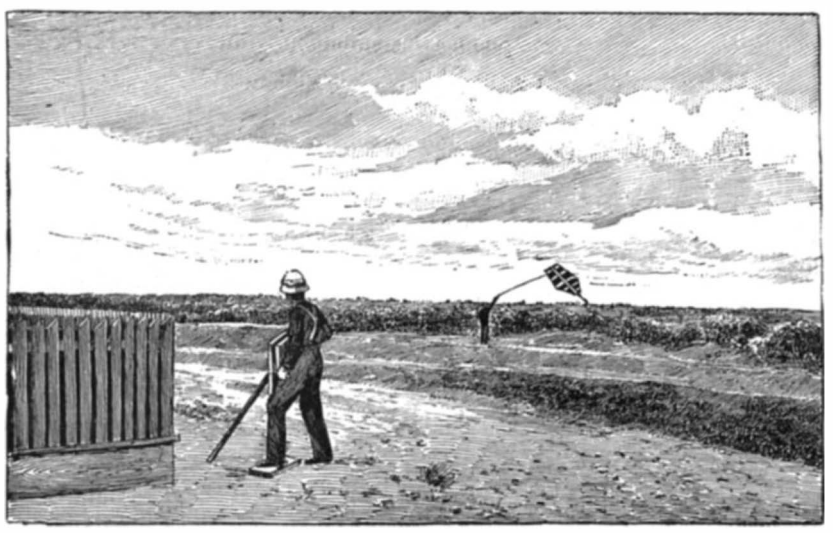

Fig. 3.—KITE FLYING EXPERIMENT.

1. Lieut. Jno. T. Ellis. 2. ———, Statistician. 3. Paul Draper, Electrician. 4. Gen. R. G. Dyrenforth. 5. Prof. Carl Meyer, Balloonist. 6. Prof. G. E. Curtis, Meteorologist. 7. Prof. Rosell, Chemist. 8. J. E. Casler, Aeronaut. 9. Prof. Powers, Author. The others are cowboys.

THE RAIN MAKERS IN TEXAS.

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Rosell. This explosion, which was reported as "beyond the conception of a person who has never been near heavy artillery in action," was unnoticed by the cowboys on the ranch half a mile away. The writer made inquiries of them and gathered this information.

The writer arrived at Midland (his second visit) on the 20th. That day a heavy rain was reported over a large area. These are the facts: Heavy, dark clouds appeared in the northwest; the explosives were made ready, and several charges fired; the clouds swerved to the west, and rain fell along the Pecos River, nearly one hundred miles west. On the plains none fell, and at the C ranch it remained dry and dusty. This was made the occasion for another sensational special, declaring another signal success. The fact is, the clouds came up and threatened rain before any explosives were used, and afterward the clouds departed for the trans-Pecos region. These facts are given partly from observation and partly from information obtained from members of the rain making party.

The following was telegraphed to the Chicago *Tribune* about August 21:

"The government rainfall expedition, under charge of General Dyrenforth, reached Midland August 5, and has maintained a continual skirmish during the last two weeks with more or less vigorous actions at intervals. During these operations there have been repeated showers and two storms, during which large quantities of rain fell. The first experiment was made August 10, and was followed by a heavy rain, which broke a drouth of long duration. This operation consisted of firing a number of bombs loaded with a high explosive, which is prepared on the spot by the experimenters. The bombs were placed on high ground and exploded by means of electricity. On the succeeding days large quantities of dynamite, 'rackarock' blasting powder, and oxy-hydrogen gas were exploded, partly on the ground and partly at heights ranging from a few feet to a mile and a half, the explosives being hung from mesquite brush and poles, suspended from large kites, or contained in balloons and exploded by means of electricity or with time fuses or dynamite caps."

This is refreshing reading to people who were on the ground and heard nothing of it. It is probably true that more atmospheric concussion was made by the jack rabbit hunters in the vicinity in one day than was caused by the combined efforts of the rain makers. Moreover, in the presence of *Texas Farm and Ranch's* representative, the party claimed to have sent up only one balloon previous to August 22, which was more than two weeks after their arrival on the ground. That is the balloon which ascended on Sunday, the 16th, four days previous to the rain which occurred one hundred miles farther west.

On the 22d another attempt was made to inflate balloons. On account of the bursting of the oxygen canisters, progess was extremely slow.

Illustration No. 1 was taken at 3 P. M., after six hours' work, and shows one balloon containing a small quantity of oxygen, and General Dyrenforth and Professor Rosell at the furnace in the board shanty wondering what is the reason the apparatus won't work. It also shows the balloonist carefully rolling up a balloon which the experience of the day has shown will not be needed, while the statistican stands by with his hands in his pockets, wondering, probably, how long it will be at the present rate of progress before he will need an umbrella.

Illustration No. 2 is the same scene taken at 6:30 P. M., from the opposite side of the field, and shows the same balloon receiving its charge of hydrogen and about two-thirds full. It also shows Professor Meyer spreading a net over the balloon to prevent its escape, while Mr. Horton, a merchant of Midland, and the representative of *Texas Farm and Ranch* are standing on one of the hydrogen tanks regarding the slow evolution of events, and getting tired. The rest of the rain making party are discussing a basket of Mission grapes and the refractory acts of the oxygen apparatus at the shanty to the right, which is not shown in the cut.

Illustration No. 3 shows one of the many fruitless attempts to fly kites without sufficient tails. It shows Professor Meyer, kite expert, paying out the cord, while the kite is making a vigorous plunge for the earth. The kite shown in the cut is an electrical kite, and the writer was informed by Professor Rosell that it eventually ascended and conveyed electric sparks (not rain) from the clouds to the earth. The writer witnessed one attempt by Professor Meyer to fly a kite. The kite was about six feet wide and the tail consisted of a single strip of cotton cambric about an inch and a half wide and ten or twelve feet long. It would be useless to tell a ten year old school boy that it would not fly with so slim a tail. At the time this attempt was made Professor Rosell called the writer's attention to some kite wreckage a few yards distant, the debris of previous unsuccessful efforts.

Illustration 4 shows the personnel of the party, with the manager of the ranch and some cowboys grouped on the porch of the ranch headquarters.

The writer left the ranch at 8:30 P. M. The balloon, which had been slowly absorbing gas all day, was not yet ready to ascend, and the writer left for Midland. When about half way an explosion was heard. Was it the balloon? That it was was a reasonable inference, which was accordingly entertained. A prominent citizen of Midland, who was on the ground, called on the writer a few days later and assured him that his inference was at fault, that the balloon was held captive for a few days and it with two others were sent up. If any of these exploded, according to the programme, it had been kept a secret from the public ear; that two of them took fire and were destroyed by slow combustion, and one sailed away intact and was found a few days later some ten or twelve miles from the place of departure.

On the morning of the 23d, between 1 and 3 o'clock, a dry norther swept the plains with a shower of dust and sand. Some explosives had been discharged in the early part of the night and the imaginative reporter claimed "another success scored by the rain makers." This storm was announced by the United States signal service eleven hours before at Omaha, ten hours before at Atchison and about six hours before at Kansas City.

QUOTATIONS AND COMMENTS.

A special was sent out announcing that in the presence of about fifty witnesses four or five explosions were made, and on each occasion copious showers followed in from ten to forty seconds. Professor Rosell's statement made to the writer was substantially as follows: A dark cloud came up, and when overhead a charge was exploded, and in a few seconds a few drops of rain fell. Soon after another cloud was passing over and a light sprinkle was falling; another charge was fired, and the rainfall perceptibly increased a few seconds later. In case of a conflict of testimony between the reporter and the professor, the writer may be excused for giving credence to the latter.

Col. Kleburg, of Corpus Christi, visited the rain makers after Gen. Dyrenforth's departure, and had an interview with Mr. Ellis, who was in charge. Col. Kleburg was informed, among other things, that Gen. Dyrenforth had expended the government appropriation and $2,000 of his own money. In the special Washington correspondence of the Dallas *News*, Gen. Dyrenforth is quoted as follows:

"After the experience in Texas, I think the venture unquestionably promises success. The cost has not been enormous. All, or all but some inconsiderable parts, of my apparatus is manufactured, and I have spent less than one-half the government's appropriation, $7,000. Every natural condition was against me. We went to a quarter of Texas where the wind blows at such a rate that operating our balloon was like reasoning with a lunatic or arguing with a bucking broncho. We had to build tanks in which to form the gas, and after doing this one of them burst and had to be rebuilt. . . . It has been said that atmospheric conditions worked with us. This is directly opposite to the truth. All but four of our first experiments were made with a rising barometer. The cowboys, who know ten times more about the subject than those special advisory agents of Providence on weather matters, our bureau officials, to a man declared for fair weather. The night of our last experiment the weather was so pronouncedly fixed to be fair that one cowboy took me aside as a friend and urged me not to try that night. He said I had done so well up to the present time it was a pity to dim the luster of my glory with a final failure, and he thought I would better just declare the date postponed. But for all this friendly counsel I went ahead. We fired from 8 to 11 o'clock that night, and at 4 o'clock in the morning I arose from the floor, where I was sleeping on camp feathers, in response to claps of thunder. The storm was on us and the rainfall great.

"I have been given the lie for saying that those rains were the first to fall in that country for three years. That is because every reporter I have talked to has seen fit to neglect to quote me as saying the first grass rain. By grass rain I mean a continued rain that makes the grass grow. Besides this, we have made dew, something unknown here. Go out in the early morning, your boots are covered with dust. The ground is so red hot the moisture in the air does not condense upon it any more than it does upon a cook stove. On the contrary, a body of hot air is constantly arising to repel the clouds that may approach. After the ground was thoroughly cooled by the rain, dew formed, and I am satisfied that it is only a question of time when we shall transform these arid plains into wet regions."

In the matter of expense there seems to have been a misunderstanding between Gen. Dyrenforth and his subordinate, Mr. Ellis.

Gen. Dyrenforth states above that, under the circumstances surrounding him, "operating our balloons was like reasoning with a lunatic or arguing with a bucking broncho." In this the writer agrees fully with the general, and no words that he could summon to his aid could more forcibly and truthfully express the absolute verity of the case. The efforts of the party to inflate, send up and explode balloons were no more successful than reasoning with the parties referred to. In this the general fully confirms all *Texas Farm and Ranch* has published regarding the balloons.

In the above interview, if correctly quoted, Gen. Dyrenforth assigns to the cowboys more knowledge of the weather than "those special advisory agents of Providence on weather matters, our bureau officials," and yet these ignorant and unscientific bureau officials predicted the rains which Gen. Dyrenforth claims as his from six to twelve hours before their arrival, and before the general's explosives were made ready to produce them. Gen. Dyrenforth corrects his reporter in one particular. He did not say that he produced "the first rain that had fallen in that country for three years," but "the first grass rain." Now it is a matter of record that beginning the night of August 25, 1890—just one year before—the heaviest rain fell in that section that has been known before, during or since Gen. Dyrenforth's arrival, washing out culverts and delaying trains on the Texas & Pacific railway nearly two days, and that rain extended from the C ranch to El Paso and beyond. The general claims that he has exceeded his most sanguine expectations in that he has "made dew here—something unknown here." The "meteorologist" of the party should have instructed Gen. Dyrenforth that on the plains, as elsewhere, dew falls only when the temperature and relative humidity are at the dew point, and that in dry seasons, dew falls in response to conditions produced by rain which may fall elsewhere, and that neither with nor without the proper meteorological conditions can Gen. Dyrenforth nor any one else "make dew" save and except the same Almighty power which is supposed to have created rain makers.

In regard to the temperature of the plains, Gen. Dyrenforth does not agree with the common experience of the inhabitants and visitors. The truth is the climate is delightful, and notwithstanding the generally cloudless sky and brilliant sun, the heat is not the least oppressive. Travelers can comfortably wear a coat the hottest day in summer. This writer traveled the road from Midland to the ranch several times during the stay of the rain makers—the very hottest part of the summer—in company with several others, but few of whom removed their coats. The summer climate of the Staked Plains, with the single exception of its sand storms, is the most delightful on the continent. For the truth of this statement we refer to any unbiased person familiar with the facts.

An American Electric Railway in England.

The first overhead electric tram line in England was opened in Leeds on October 29. Hitherto such objections have been raised to the unsightliness of such lines that, in spite of their obvious economy, all previous attempts at electric traction in Great Britain have been either on the conduit central rail or storage battery system. The new line has been fitted up by the Thomson-Houston Company. The maximum grades are 1 in 20 and 1 in 21 each for a distance of one quarter mile, while another grade of 1 in 28 is three quarters of a mile long. The power station, which is a temporary structure 85 feet by 36 feet in area, contains two Thomson-Houston 80 horse power dynamos, with the usual fittings. The engines are of the single cylinder high speed type, and are supplied with steam from a Babcock & Wilcox boiler. The trolley is carried on standards 21 feet high, from which the current is drawn off to the motors on the cars through a small grooved wheel, which is pressed against the under side of this bar, and runs along it as the car progresses. The return current from the car passes through the wheels to the rails and the return wire. Each car is fitted with two 15 h. p. motors.

The Trade Rats of Arizona.

A miner near the Senator recently had a rather singular experience with trade rats, known also as mountain rats. As the nights were cold the miner took his ore sack to replenish his rather hard bed. Having neglected to come to town for several weeks, his supply of beans had given out, and he had come down to a diet of straight bacon. Considerably out of humor, he started in to pull his bed to pieces one morning, and in removing the sacks was agreeably surprised to find three pounds of beans, with a little coffee mixed, which the trade rats had brought from the Senator and stored in his bed.

The rats are native Americans, and very different from their imported Norway cousins. They are called trade rats because they generally leave some article in exchange for what they take away.

The miner states that he never killed a trade rat; that these rodents habitually steal from one cabin and carry their plunder into an adjoining one; that on one occasion he spilled a couple of quarts of corn on the floor of his cabin and the next morning found the rats had stored away every grain of it in a pair of saddle bags hanging upon the wall.

He also states that the rats have thick caudal appendages, about three inches in length, which they keep constantly throwing up and down, striking the floor with each downward movement with the regular measured stroke of a musical professor marking time. They carry off plugs of tobacco, tooth brushes, combs, and brushes, in fact, anything which they can manage to move.—*Prescott Courier.*

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LORILLARD HOUSE BOAT CAIMAN.

The mild climate of a considerable portion of our Southern Atlantic coast, where flowers bloom nearly the whole year through and vegetation but seldom shows the effect of frost, offers temptations to the leading of an outdoor life which are especially attractive to one accustomed to more northern temperatures, and which can with difficulty be resisted by invalid visitors to that section. The primary design of the house boat shown in our first page illustration is to provide a comfortable and luxurious home in which all the delights of such a life can be realized, with as few as possible of its inconveniences, a floating house which can be moved from place to place at will, and anchored in such favored locations as fancy or caprice may dictate. The shallow bayous, lagoons, rivers, and lakes of Florida, in particular, stretching in some cases far into the interior, their banks lined with a semi-tropical verdure, afford the ready channels by which, in such a boat, a great extent of most picturesque and beautiful country can be reached, the varied attractions of the hunting and fishing everywhere found being such as to extort the unqualified admiration of all sportsmen.

The Caiman is but just completed, and was built for Mr. Pierre Lorillard, of New York, by the Pusey & Jones Company, of Wilmington, Del. She is a steel hulled scow, flat on the bottom, with round spoon ends, driven by two small propellers, each operated by a separate engine, the two engines being designed to develop 200 collective horse power. The steel hull portion is 5 feet 6 inches in depth, and her greatest draught is estimated at thirty inches, her speed not being designed to be over eight or nine knots an hour. In fact, speed has hardly been taken into the account, farther than to be sure that she will always be able to make her way where desired, slowly pushing from one point to another. The boat is 97 feet 6 inches long, 26 feet 6 inches extreme breadth at the top and 20 feet wide at the bottom.

The hull, besides affording space for the boiler, engines, and an ample coal supply, serves as a very roomy cellar in which a large ice supply and abundant stores of all kinds can be kept. Upon the hull is built the house proper, the outside of which is of pine wood. The first floor is for the use of the crew and servants, but horses, ponies, dogs, and other animals can be taken on a portion of the inclosed deck forward. The kitchen has a range and hot water boiler, the hot water service extending to the pantry and toilet rooms, and there is a dumb waiter communicating with the pantry just forward of the dining room. The rooms for the crew are aft, and there are rooms on this floor for two maids, two waiters and a valet, besides two small spare rooms for gentlemen. The space and appointments have all been carefully considered with reference to the comfort and convenience of all who will be attached to the boat.

The arrangement of the space on the main deck above, or the top floor of the house, is shown in the plan view on the first page. The fore part is devoted entirely to the use of Mr. Lorillard and his friends. The windows, besides the glass and blinds, are all fitted with a very fine wire netting, as a protection against sand flies and gnats, all sliding easily on frames, that the windows may be entirely opened when desired. The bed rooms will each have a brass bedstead and a large wardrobe, the panels in the doors of the latter having plate glass mirrors. The decorations are to be of white and gilt and ebony and gilt, the ceilings and walls being upholstered in cretonne backed by Canton flannel padding, different colors being employed in different rooms. On the hurricane deck, abaft the pilot house, there will be a studio.

The architect of this novel vessel, Mr. Gustav Hillmann, gave her the name Caiman, which in Spanish signifies an alligator; but it is said that Mr. Lorillard himself made the original drawings for the boat, almost as detailed as those made by the architect, who simply had to put the design into the correct technical shape for the builders. Mr. Hillmann was also the architect of Mr. William Astor's Nourmahal, Mr. Gerry's Electra, the Radha, designed for Mr. Lorillard, and now owned by Mr. Bourke Wolfe, and many other well known vessels.

Besides the Caiman, Mr. Lorillard also owns the Reva, a twin-screw yacht designed by Mr. Hillmann, a staunch, commodious and luxuriously fitted up seagoing vessel designed for general cruising purposes. With this yacht he is able to take in tow another vessel of novel character which he had built as a stable, so that he can take with him, to any locality where he wishes to remain for a time, a few horses for his private use. The steel launch Lillian, built for Mr. Lorillard about two years ago, was illustrated in our issue of February 8, 1890. She is 65 feet long, 10 feet wide, and 6 feet deep, having a triple expansion engine of 75 horse power, and was designed for short shooting excursions on the Florida and Georgian coast. As with all the other craft owned by Mr. Lorillard, she is most sumptuously fitted out, in harmony with the luxury in which he lives.

THE average rainfall of the globe is 36 inches.

Cheap Aluminum.

The *Electrical World* claims that aluminum may fairly be called the foster child of electricity, for up to the time when the Heroult process and its various modifications came to the front the lightest of the important metals was only a chemical curiosity. As the electric processes have been more and more perfected it has come to be a commercial product, and, although not yet used for very many purposes for which it is immediately available, it is likely to assume more and more prominence. An interesting scrap of news comes just at this time from the other side of the water; this is a reduction in the price of aluminum of ordinary grade to so low a figure as fifty-seven cents per pound. This reduction, made by the company at Neuhausen, the largest manufacturers on the Continent, is stated to have resulted in an immense increase in the demand, and presumably, therefore, in the profits of the manufacturers. It is quite possible that the commercial conditions existing here may for the present forbid American manufacturers meeting the current German rate, for to our country's credit be it said that labor is much better paid here than there, but it is, nevertheless, quite clear that it will not be long before the price of aluminum—thanks to the resources of the electrician—is reduced to a point where the metal can be employed for a wide range of uses not now practicable. A fall in price from two dollars to one dollar per pound still leaves the cost so great as to very seriously limit the demand; at fifty or sixty cents a pound, however, aluminum is within reach of effective competition with other materials for a very large variety of work. In this connection it may be stated that a new system of electroplating with aluminum has been discovered. The London *Electrical Review* describes the process as follows: A solution of ammonia alum in warm water is prepared, containing 20 per cent of alum. To this is added a solution containing about the same quantity of pearlash and a little ammonium carbonate. The mixture results in effervescence and in the deposition of a precipitate. The latter is filtered off and well washed with water.

A second solution of ammonia alum, containing sixteen per cent of alum and eight per cent of pure potassium cyanide, is now prepared warm and poured over the precipitate previously obtained, the mixture being then boiled for thirty minutes in a closed iron vessel, jacketed, to insure uniformity of heating.

At this stage about twenty kilogrammes of water are added, and about two kilogrammes more of potassium cyanide, and the whole is kept on the boil for about a quarter of an hour.

The liquid is then filtered from the precipitate, and is now ready for use in the electrolytic bath.

Uses of Unvulcanized Rubber.

There are used in the leather shoe trade annually many thousands of barrels of rubber cement, which is of course unvulcanized rubber in solution. A number of manufactories are run particularly on this sort of work, and their output to a large degree is sold directly to the leather shoe manufacturers. The process is a simple one, Para rubber being used and benzine being the solvent. In order to get the finest, lightest and cleanest cement possible, the outer skins of the hams of Para are taken off, and the inner part, after being stripped and separated into as many parts as possible, is soaked in benzine until it is very much softened and has increased its bulk about four times. This is then put in a large churn run by power, and a little resin is added to increase the sticking qualities. It is then stirred for a number of hours, more benzine being added from time to time until a homogeneous mass is obtained, after which it is barreled and sent to the shoe factories.

A small outlet for this sort of cement is found among photographers for sticking purposes, to whom it is sold after having been very much thinned by the addition of more solvent. For repairing purposes a cement is used to which has been added a little lamp black and a certain quantity of litharge for the purpose of drying after it has been applied. Another form in which unvulcanized gum is sold is that of various packings that are to go in places heated by steam, where the gum, after being put into place, is slowly vulcanized and has a certain life added to it by having missed the first process of vulcanization.

What is known as cut sheet is used largely in this country and abroad. It is nothing more or less than pure gum which has been massed upon a mixing mill and afterward put in a rectangular iron box and pressed into a solid cake. This box is fitted with a traveling arrangement something like that of a planer, so that the cake of rubber can be slowly fed out of one end against a small revolving knife, which cuts it into the thinnest possible sheets. These sheets are used in making balloons, tobacco pouches and articles of that kind. It requires no little skill to make these goods from unvulcanized rubber. To make a perfect sphere, it is a matter of common knowledge among balloon makers that no number of pieces less than seven can be used. The pattern cutters may use nine, eleven, thirteen or fifteen pieces, always going on the odd number, as it is claimed that a balloon made of eight, ten or twelve pieces would not expand evenly.

Goods made of cut sheet are usually cured by the cold process or by the vapor cure, and in some cases are used without any vulcanization at all. Formerly India rubber thread was made of gum treated in much the same manner as the cut sheet, and a great deal of skill was attained in its manipulation. These threads were made so fine that from 7,000 to 8,000 yards of one kind would weigh only one pound. They were used not only in suspender webs and goring, but in Jacquard looms in place of webs, in some looms as many as 3,000 of these threads being used.—*Rubber World.*

The Detection of Hydrocyanic Acid in the Blood.

Professor R. Kobert, director of the Pharmacological Institute at Dorpat, has lately published a little work, which is a valuable addition to our knowledge with regard to analysis of the blood for hydrocyanic acid. The chief result of his experiment has been to prove that hydrocyanic acid forms, with methæmoglobin, a new body called cyanmethæmoglobin, distinguished by its intensely red color, and distinguishable from oxyhæmoglobin and its modified combinations, which are likewise red, by the spectroscope only. Neither the spectrum of oxyhæmoglobin nor that of the alkaline red methæmoglobin, nor any characteristic absorption band, is shown by cyanmethæmoglobin in the spectroscope. It is due to this body that the blood, after hydrocyanic acid poisoning, shows such an intensely red color in all places where methæmoglobin can be found; but as oxyhæmoglobin, which gives the blood its normal color, may with the greatest ease be transformed into methæmoglobin, it is consequently easy to recognize hydrocyanic acid not only in the blood, but with the help of the latter by the following analytical process: A cubic centimeter of blood is diluted with ninety-nine times its volume of distilled water, to which is added, drop by drop, and with continuous shaking, a newly prepared 1 per cent solution of ferrocyanide of potassium. When the blood is free from hydrocyanic acid the liquor changes from red to yellow—that is, methæmoglobin is formed, and the spectrum of the latter is seen. Blood containing hydrocyanic acid does not lose its color, but becomes bright red, and shows no absorption band in the spectrum; or, in other words, cyanmethæmoglobin has been formed. By exactly the same process any organ may be analyzed for hydrocyanic acid if it has first been distilled in acetic acid. It is necessary to observe in all these experiments that neither the diluted blood nor the examined liquids become alkaline, but rather show a slightly acid reaction, because methæmoglobin also becomes red in alkaline liquids.

Professor Kobert gives yet another method to distinguish blood which contains hydrocyanic acid from normal blood, which he bases on the fact that the self-reduction of the blood is arrested by the presence of the smallest quantity of hydrocyanic acid. A 1 per cent solution of normal blood becomes darker when standing, and shows after some hours or days, in place of the oxyhæmoglobin spectrum, the spectrum of reduced hæmoglobin—that is, only one yellowish-green band in place of two such bands. Blood which contains hydrocyanic acid remains under the same circumstances without change.—*Lancet.*

Furnace Shields.

All the puddling furnaces at the works of the Eisenindustrie Menden & Schwerte, in Westphalia, Germany, have been equipped with shields to protect the men from the furnace heat. The shields consist of a rectangular iron screen suspended from an overhead rail, which can be made to cover the whole working side of the furnace, and which can be pushed aside when not required, or when it interferes with the work. The lower end is bent into a gutter, having a slight fall in the direction of its length, and the upper edge is provided on the inside, that nearest the furnace, with a pipe perforated with small holes about three-quarters of an inch apart, which is in connection with the pipe supplying water for cooling the sides of the furnace bed. When in use, the inside of the screen is kept constantly wet from the supply pipe, the jets trickling down the screen; a notch is left at the bottom of the screen for the passage of the rabble, and a short inclined plate is provided for the cinders to run over. With these exceptions, the whole of the furnace is screened by the water-cooled plate.

Colorless Varnish.

Colorless varnish, for use on fine labels or other prints, as well as for whitewood and other spotless articles, is made as follows: Dissolve two and one-half ounces of bleached shellac in one pint of rectified alcohol; to this add five ounces of animal boneblack, which should first be heated, and then boil the mixture for about five minutes. Filter a small quantity of this through filtering paper, and if not fully colorless, add more boneblack and boil again. When this has been done, run the mixture through silk and through filtering paper. When cool it is ready for use. It should be applied with care and uniformity.

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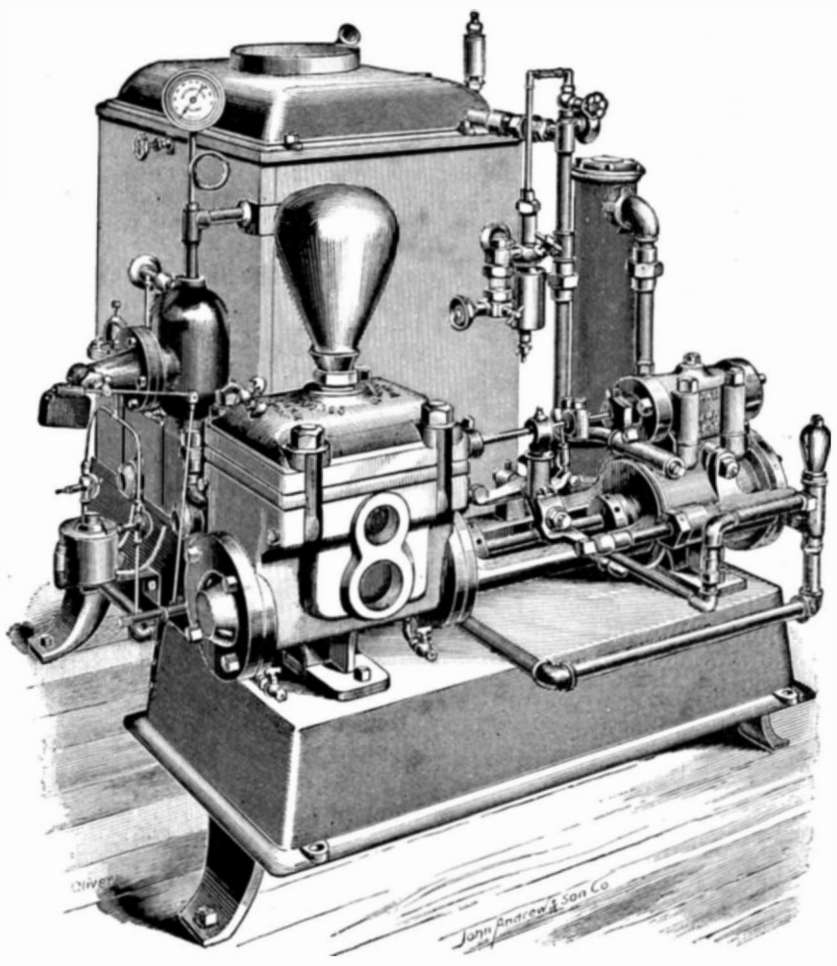
AN IMPROVED SHIPMAN PUMPING OUTFIT.

The illustration represents a new and improved pumping outfit, made by the Shipman Engine Company, consisting of a boiler and pump on one base, thus making a self-contained plant and dispensing with the old method of pumping water with an engine and belted pump. The steam being applied direct from the boiler to the pump saves the power heretofore lost on the engine, belt, and the gearing of the pump, consequently a greater amount of water can be delivered with the same boiler pressure. No engine being used, the services of a skilled engineer are dispensed with. The supply of fuel is automatically controlled by a diaphragm which can be set at any given pressure, and the pressure will vary but a few pounds either way. The water supply is also automatically controlled by ball float in float chamber connected direct with cut-off valve in pipe leading from feed pump to boiler. The feed pump is attached direct to the piston rod of large pump, as shown in cut. This arrangement of fuel and water supply leaves nothing for the operator to do, beyond the opening and closing of the throttle valve, when it is necessary to start or stop the pump, there being no small pet cocks or valves to adjust.

The economy of room is a very important feature, the plant we illustrate having a floor space, inclusive of legs, of only 38 x 39 inches. This is no more than is ordinarily occupied by the average small power engine commonly used for pumping purposes, and it does not require a skilled mechanic to set up or operate this machinery, as a person of ordinary intelligence can be taught its management in a few hours. The entire outfit is of the best manufacture, the boiler having been tested to 400 pounds pressure per square inch. All of these combined pumping plants are shipped complete, crated, so that no trouble is liable to occur, as there are no parts to adjust, and full and complete instructions are sent with each shipment.



THE SHIPMAN AUTOMATIC SELF-CONTAINED PUMPING OUTFIT.

A WISCONSIN RAILWAY COLLISION.

A railway collision took place in October last near Menomonie, Wis., in which, by rare good fortune, none of the passengers were hurt, although two locomotives were very badly broken up, as shown in our illustration. An Omaha train going west on the St. Paul and Minneapolis Railroad crashed into a stock train which was coming from an opposite direction on the same track. The engineer of the passenger train had forgotten an order to await the stock train at a switch, and, when it was seen that the collision was inevitable, the engineers of both locomotives put on the air brakes, reversed their engines, and, with their firemen, jumped for their lives. The speed of both trains was thus reduced so that they were running at the rate of only about ten miles an hour when they came together, but both engines were demolished, and the baggage and express cars and four stock cars were wrecked. Some of the train hands were slightly hurt, but none seriously, while about twenty-five head of stock were killed, and many others so wounded that they had to be put to death.

WRECK OF TWO LOCOMOTIVES IN A WISCONSIN RAILWAY COLLISION.

The Treatment of Tachycardia.

The most distressing affection known as paroxysmal tachycardia, or "rapid heart," has unfortunately not generally proved as amenable to treatment as could be desired; but Dr. Poulet, of Plancher-les-Mines, has recently found a remedy in a little known plant indigenous to Alsace, which appears to exert a rapid and beneficial influence over the paroxysms. The plant in question is the Coronilla varia, or *faucille*, which, like some other species of Coronilla, is sometimes used as a household remedy, being considered to have cathartic and diuretic properties. Some recent researches by MM. Spillmann and Haushalter on a closely allied species—Coronilla scorpioides—showed that that plant acts as a powerful heart tonic, causing an increase in the arterial tension and in the fullness of the pulse, exciting diuresis and diminishing œdema and dyspnœa—acting, in fact, very similarly to digitalis. Dr. Poulet was induced by these researches to make trial of Coronilla varia in heart cases. He employs a tincture made from the entire plant (1 in 5), also a powder made from the flower. The dose per diem of the tincture is from half a drachm to a drachm, and that of the powder from fifteen to thirty grains. These preparations, though they have a strong characteristic odor, are not nearly so disagreeable to the taste as those of Coronilla scorpioides. Details are given of two very severe cases in which these preparations of the Coronilla varia gave almost immediate relief. M. Poulet recommends this drug also in other heart cases where digitalis has been used, and where it seems to have been given for too long a period, or, as sometimes occurs, where it has begun to act on the gastro-intestinal canal.—*Lancet.*

Composition for Printers' Rollers.

There are several modes of making roller composition, and nearly every country printer has his own pet method. You do not say what proportions of the various ingredients you use, so it is difficult to tell in what direction you err. Here is a recipe that may suit you. One and a half parts of best glue to one part molasses. Place the glue in a basin and let it soak for half an hour in clean water, then drain off the water and let the glue remain covered for about three hours. It should then be put into a melting kettle, and when thoroughly melted the molasses must be added, pouring it in slowly and stirring well, the whole boiling about one hour longer. It can then be poured into the mould, which should be perfectly clean and well oiled before using. Another recipe is glue five parts, sugar five parts, and glycerine six parts. Of course the proportions must be varied according to the time of year, using more glue in the summer and less in the winter. To prevent mouldiness add a little carbolic acid to the composition when melted. In washing rollers containing glycerine, water should not be used; benzine, turps, or what is more preferable, oil of camphor. This cleaning agent is extensively used in Germany for cleaning ink off rollers, type, machines, etc., and has many qualities to recommend it. We may ask, why do you trouble about casting your own rollers, or making composition, when there are reliable firms that will supply a much better and more economical article than you can ever possibly make? —*Printer and Stationer.*

Prospective American Coal Exports.

The United States have made such remarkable progress in all the arts and manufactures within the last ten years that it is important to the rest of the world, and more particularly to industrial nations like our own, to ascertain, if possible, how far that progress is to be continued in the future. Two of the most essential elements of such progress—cheap coal and efficient labor—are not only at the command of American manufacturers, but are being enjoyed by them in an increasing degree. As regards fuel, indeed, no country of industrial importance possesses such an ample store. The known area of the United States coal fields is stated at 98,430 square miles, or nearly six times the area of the coal fields of the United Kingdom. But this does not include any of the States in the Rocky Mountain section, such as Dakota, Montana, Wyoming, Utah, Colorado, nor does it embrace the Pacific States of California, Oregon, and Washington, of which the coal areas are less accurately known. There is reason to believe that the coal areas of the United States are much larger than is commonly supposed, but in any case they are larger than those of all Europe.

It will naturally excite some surprise that with such remarkably cheap coal at command, the United States do not, like England, Germany, and Belgium, send considerable quantities to other countries. Coal at 4s. per ton at the mines should certainly be able to compete with coal costing nearly 6s. per ton like that of Germany, or about 8s. per ton like that of Belgium. The explanation is that, although the United States do export a certain quantity of coal to South and Central America and Canada, they have never hitherto laid themselves out to any extent to cultivate this branch of the trade, having enough on hand in meeting the vast requirements of their own arts and industries. But there is no reason to doubt that the time will come when the United States will be in a position to compete successfully with English coal in markets where the latter has now a practical monopoly. Whether this will be hurtful to England may be a moot point. There are many who think it would be well for our future, if not for our present, if some embargo were placed on the unrestricted export of British coal to countries that use that coal to promote their industrial interests against our own. —*Engineering.*

Mastodon Remains, New York City.

The Museum of Natural History has been enriched with a mastodon's tusk, which was lately uncovered by the laborers employed in excavating the Harlem Canal, in the northern part of the city of New York. It is four feet long and six inches diameter at the base. It is in a good state of preservation. It was found in the bog, sixteen feet below the surface, in peaty ground.

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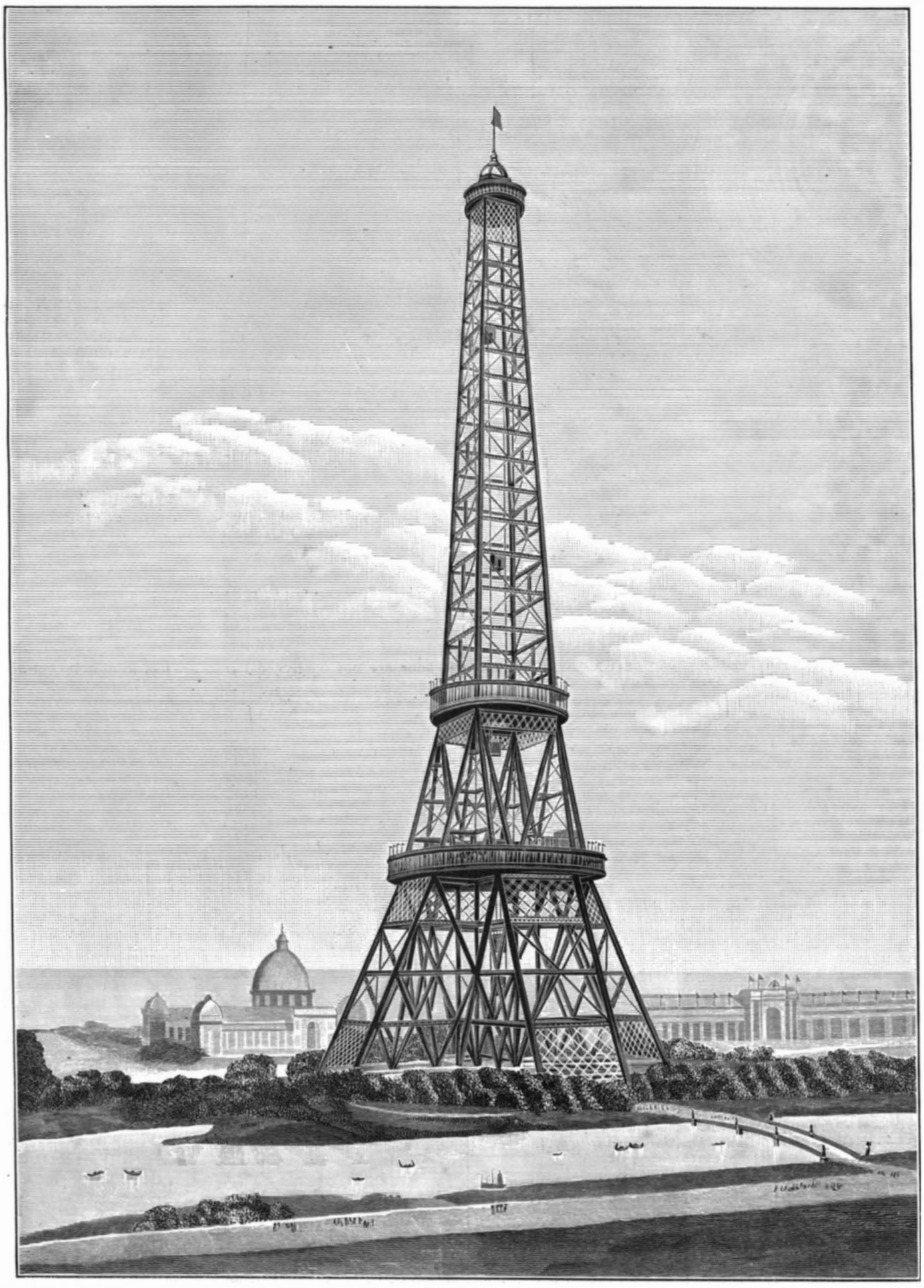
THE COLUMBIAN TOWER.

After much uncertainty and discussion, it has been definitely decided, so says *Engineering*, that a high tower shall form one of the conspicuous attractions of the exhibition at Chicago in 1893. We do not understand that this work is any portion of the official plan; but that, on the contrary, it is made the subject of a concession to the capitalists who provide the necessary funds and expect to gain a large return. We think it a matter of regret that an exhibition so original in all its general features should be marred by the adaptation of an idea—though absolutely novel and successful at Paris in 1889—from another exhibition. But this is a matter of opinion, and it is eminently satisfactory to note that the Columbian tower has been designed by so eminent an engineer as Mr. George S. Morison, of New York and Chicago. It is stated that the capital will be furnished by Mr. Carnegie. We are without details at present of this interesting work, but we publish a perspective view of the general design. The tower will be higher than that of Eiffel by more than 150 feet, and, as will be seen from the illustration, Mr. Morison has been no slavish imitator of Eiffel's beautiful structure. There is not much time to complete the work, and no doubt many difficulties will be met with both as regards foundations and the rigorous winter seasons, but we may feel confident that American skill and energy will carry through the work to a successful conclusion by the spring of 1893. Indeed, we are informed that Mr. Carnegie asserts the work will be completed in six months after it is commenced. The weight of steel is 6,000 tons.



THE PROPOSED COLUMBIAN TOWER, CHICAGO.

Vanilla.

Mr. Horace G. Knowles, United States consul at Bordeaux, reports that Paris, London, and New York are the markets of the world for vanilla; after these Bordeaux occupies an important place. Great quantities of the bean are used in France. It is employed for making confectionery, pastry, ices, liqueurs, and cordials, and enters into the manufacture of perfumery.

Vanilla is of Mexican origin, though found in almost every tropical country. It is a vigorous vine of the orchid species, about 20 to 30 feet in height, with heavy oblongated, sea green foliage. It thrives in dense forests, where its branches entwine and interlace themselves with neighboring trees. The stem is four-cornered, or quadrangular, the flowers large, fragrant and spike-like. It yields to cultivation.

The greater portion imported into France comes from her colonies—Gaudeloupe, Madagascar (Sainte Marie), Mayotte, the island of Reunion, and Tahiti. Reunion furnishes 500,000 pounds yearly—the others about 50,000 pounds.

The vanilla tree begins to yield in its third year and yields from thence to its thirtieth. The season commences in the month of April and lasts until the middle of June. The beans are gathered in their green state.

There are two existing methods of curing vanilla. In the first of these the beans are laid in quantities on great cloths spread upon the ground and exposed to the sun for a period of two months or until they have attained a dark brown color. They are then bunched in bundles of fifty and packed in tin boxes for exportation. The second method consists of attaching together by their inferior extremities a number of the beans and immersing them in a vessel of boiling water until they become white. They are then exposed for a few hours only to the sun, after which they are covered with a native fixed oil, usually that of the cashew nut.

There are four qualities of vanilla, and these are determined by the length and size of the bean, it being found that the flavor and perfume are in direct ratio to the weight and measurement. In appearance the beans are slender and cylindrical, averaging about 5 or 6 inches in length and half an inch in thickness. Within is a soft black pulp. Certain Spanish words are used to distinguish the qualities, as *primeira*, first, 10 inches in length; *chica-prima*, second; *sacate*, third; and *basura*, fourth. The quality of the bean is afterward further enhanced by the exudation of a certain needle-like crystal or efflorescence which covers the surface of the fruit, and called in French *vanille givrée* (frosted vanilla). The crystals are found to be almost pure benzoic acid.

Progress of Iron and Steel and Tin in California.

The steel works plant at Roseville, a suburb of San Diego, will be in operation soon. Iron will be shipped by water to the works from the Tepustete mine, at San Ysidro, Lower California, fifty miles south of Ensenada. The vein averages 125 feet in width, and has been traced on the surface for a distance of over 2,000 feet. Dr. Eames says at least 85,000 tons of metallic iron ore is in sight, which averages 68 per cent of iron.

The Los Angeles *Times* claims that within 175 miles of Los Angeles there exists the finest body of Bessemer iron ore, both in extent and quality, in the United States. This ore body is tributary to Los Angeles, lying as it does near the line of the Atlantic and Pacific Railroad, in the vicinity of Newberry, the first station east of Daggett.

It is the property of the California Iron, Steel and Tinplate Company, who have now a corps of engineers on the ground making surveys of their holdings, and also a line for a narrow gauge railroad from the mines to Newberry, and also have a number of men employed developing the mines.

The ore body is a solid mass of Bessemer, without a rock or break, 400 feet in width, of more than 3,000 feet in length, and of apparent great depth—300 feet of which is already exposed.

Two new veins of rich ore have been pierced in the mining operations of the Temescal tin mines, near South Riverside. The new concentrators and ore breakers are in full working order.

The Temescal Company is now putting out from three to four tons of block or pig tin per day.

A Drug Explosion.

A student of pharmacy in Hesse was called upon to put up a prescription containing a 20 per cent solution of chromic acid, salicylic acid, and water. He put the crystals of chromic acid directly into the alcohol, whereupon an explosion took place, and the unfortunate student was severely burned in the eyes.

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RECENTLY PATENTED INVENTIONS.

Engineering.

ROTARY STEAM ENGINE.—Edward H. McDonald, Wytheville, Va. This is an engine of the double piston pattern, in which the casing is composed of a series of sections, and having a steam chamber in which epicycloidal pistons are arranged, while there are inlet and exhaust plugs communicating with steam and water passages, levers being attached to the plugs and pitmen connecting the levers. The parts of the engine are also so made that it may be used as a pump for forcing feed water to the boiler, and so that the exhaust steam may be employed to heat the feed water.

Railway Appliances.

CABLE GRIP MECHANISM. — George Muller, Hoboken, N. J. This invention provides an improvement specially designed to enable the operator in charge of the car to quickly and conveniently throw off the cable after it is released by the gripping jaws, or to pick up a cable traveling in the same or a different direction or at a different rate of speed, and place the picked-up cable between the jaws of the grip. The invention consists of an angular arm or arms connected with a pivoted guiding arm, and a link pivotally connected with a sliding bar, and facilitates the picking up or throwing off of the cable at will whenever desired.

SLIDING RAILWAY.—Charles A. Barre, Paris, France. This invention relates to hydraulic propulsion railways of the S. D. Girard type, in which the rails are on an elevated structure with a main carrying water under great pressure, from which there are upwardly projecting branch pipes termed propellers having discharge nozzles, automatically operated by shifting levers on the car, the water being turned into chambered slides or skates which slide on the track, and which when the train is at rest have a metallic contact with the rails. The slides or shoes constructed according to this invention are designed to have several important advantages, being arranged for an oscillatory and vibratory movement on the support and bearing axle, and having a water-receiving chamber open at the bottom, with contact or slide faces surrounding the opening, and other novel features.

Mechanical Appliances.

ROCK BREAKER. — John H. Bloomer, Jersey City, N. J. A derrick having a laterally swinging boom has a hammer or weight freely suspended by a cord or cable from the free end of the derrick boom, while in connection with the derrick is a winding and releasing mechanism for the cable. It is designed to use with the device a heavy, steel-faced hammer, which is to be raised by the cable as high as the boom will permit and then dropped upon the rock or stone to be broken.

BELT SHIPPER. — James R. Balsley, Connellsville, Pa. This device comprises a hanger on which is pivoted an arm terminating at one end in a depending bend opposite which is a shoulder, a dog being pivoted on the shoulder to impinge against the arm, while a lever is pivoted to the lower end of the dog and to the hammer, with means for operating the lever. By this means the belt may be conveniently shifted from the tight to the loose pulley or *vice versa*, and will be started in the right direction when shifted to the tight pulley.

SET SCREW. — Lycurgus A. Geisinger, Center Valley, Penn. Combined with a punch is a headless screw formed with a central aperture adapted to be engaged by the punch, with a plug adapted to be driven by the punch passing through the screw and adapted to be engaged by the latter to hold the plug in place. This set screw can be readily applied, and is designed to very securely fasten parts together, while presenting no outside projections when in place. The same punch can be used for driving a large number of set screws.

GLAZIER'S HAMMER. — Thomas C. Grimshaw, Pittsfield, Ill. This is an improved form of hammer, of simple and durable construction, for conveniently driving the points to hold the pane of glass in place in the frame. It has one head on which is pivoted a triangular face, the face thus being movable, while the other head has a ring of soft material, preferably rubber, to deaden noise when moving the hammer over the pane of glass when driving the points.

Agricultural.

ENSILAGE HARVESTER AND CHOPPER.—William J. Conroy, Aylmer, Canada. By drawing this machine over a field of standing fodder, it is designed to harvest or mow the fodder, cut it up into pieces of the right size, and deliver the chopped material to a receptacle on a cart following. A conveyer is located at the rear of the harvester knives, and at the rear of the conveyer is a downwardly extending chute, above which spirally arranged revoluble knives are journaled, while there is a second conveyer at the base of the chute, there being a driving connection between the driving mechanism of the harvester, the conveyer shafts, and the knife shafts.

GUANO DISTRIBUTER AND SEED PLANTER.—Hezekiah Vickery, Willacoochee, Ga. This invention relates generally to agricultural implements and especially to a combined fertilizer distributer and corn and cotton planter. A corn hopper is secured to the central beams, and in an apertured lug on the lower end of the hopper is a spring rod on which is a disk forming the bottom of the hopper, there being a transverse shaft on which is an arm intermittently engaging the rod to move the disk to one side, to discharge a measured quantity of the contents of the hopper. Different hoppers are provided for the fertilizer, corn, cotton, seed, etc.

HAY STACKER. — Oliver H. Buck, McLean, Ill. This is a portable structure, consisting of an open frame tower mounted on runners, and having two central cross pieces or platforms through which extends a mast, adapted to be raised and lowered by a rope, there being on top of the mast a swinging arm with a pulley and hoisting rope. The hay is elevated by tongs connected with the rope from the arm, which may be swung around to place the hay where desired, and the mast is readily raised in the tower as the stack increases in height.

Miscellaneous.

VENDING APPARATUS. — Oscar T. Smith, Buena Vista, Va. Upon a track which is preferably endless and circular, a goods receiver in the form of a locomotive and tender is adapted to run, there being in the track a stop device and a tripping readjusting device, the locomotive having a motor mechanism and stop devices to be operated through the aid of a coin. The motor is preferably a clock mechanism, and the goods receiver has a pin which operates the discharge devices, the receiver traveling through a passage where it receives a portion or quantity of goods, and then passes out to deliver the goods to a purchaser. The device is automatically operated by the insertion of a nickel or other coin in the coin chute.

MONEY DRAWER.—Frank Mahannah, Omaha, Neb. A cover is hinged to the top of the drawer near its rear end, the cover closing when the drawer is shut, and flanges or guards closing the spaces between the sides of the drawer and cover when the latter is raised. The improvement is designed for adoption in sliding money drawers used on counters in stores, offices, banks, etc., to prevent exposure and abstraction of the contents of the drawer when open, by parties standing in front of the counter.

KNOCKDOWN SAFE.—Henry J. Moyer, Frackville, Pa. This is a safe for fruits, vegetables, and other food products, designed to be convenient, inexpensive, and afford through ventilation, while being so made as to be readily taken apart and quickly and easily set up. It has two pairs of detachable end standards, a sectional and folding bottom, a central folding shelf, a sectional and folding top, a back formed of two vertically swinging doors and a front formed of two horizontally swinging doors, while the four sides of the safe have openings covered by screen cloth.

RUCHING MACHINE. — William H. Holeywell, New York City. In this machine a traveling chain composed of a series of tubular dies pivoted together is operated in combination with a reciprocating plunger, a spring-actuated presser foot bearing and sliding on the open ends of the traveling dies. When a strip of material is fed to the machine it automatically forms therefrom a ruffle or ruching, flat or puffed, and integral with the body of the trimming is a continuous strip to be used for the attachment of a band. The machine makes a grouping or chain of figures, each simulating a complete ribbed shell, all of the shell-like figures apparently forming a portion of a common base.

WICK TRIMMER. — Chauncey R. Burr, Boston, Mass. This is a device designed to facilitate the accurate and convenient trimming of circular wicks on a burner, without the operator soiling his hands or the lamp. It consists of a ring to engage the outside of the wick, and a knife mounted to turn in the opening of the ring to engage and cut the wick from the inside. Any desired length of the wick can be trimmed off, the cutting being accurately and evenly effected.

CLOTHES PIN. — John A. Johnson, Trempealeau, Wis. This device is made of wire, and has at one end a spring clip to receive the clothes line, while at the opposite end is an oblong loop having a narrow tapering portion, a spring tongue extending through the loop. The pins are attached to the clothes in the house, or where it is most convenient, the attachment of the pin to the clothes line being readily effected by the spring clip.

OVERSHOE ATTACHMENT.—Joseph H. Morison, Centralia, Kansas. This is a clamping device for attachment to the heel end of rubber or other like overshoes, and having opposite lateral clamping wings in hinged connection at their inner ends with a central plate on the shoe, a cam lever being pivoted on the plate to bear on the backs of the wings. The improvement is designed to insure the quick, easy and firm fastening of overshoes upon the feet, so that they cannot slip or be accidentally drawn off.

ELEVATOR AND DUMP. — William H. Enos, Chebanse, Ill. This invention relates to devices used for unloading grain from farm wagons, and provides means by which wagon body may be raised from the running gear and the grain quickly dumped in suitable bins, the wagon body being quickly returned to place. A rope from a windlass is passed over guide pulleys, pulley blocks being mounted in loops in the rope, while there is a shaft between the loops around which one member of the rope is wound, with means for operating the shaft. The improvement may also be used for dumping coal or other articles.

LAWN SPRINKLER.—William A. Russell, Los Angeles, Cal. The head of this device is made in two sections fastened together and mounted to turn on a fixed tapering discharge pipe opening into the head, the latter having discharge chambers with an inclined end formed with openings. A high pressure is not required to revolve the head, which is designed to distribute the water quickly over the entire area covered by the sprinkler, and the device is simple and durable in construction and not liable to get out of order.

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Notes & Queries

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Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information and not for publication.
References to former articles or answers should give date of paper and page or number of question.
Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.
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Books referred to promptly supplied on receipt of price.
Minerals sent for examination should be distinctly marked or labeled.

(3802) D. D. asks: What will stick glass to cast iron or brass frames so that it will not let go in rough handling? A. Try gelatine dissolved in acetic acid, with a small percentage of glycerine (about 1 part to 10 parts of the dry gelatine) added.

(3803) A. D. F. writes: 1. I have a bichromate battery, and after I have used it and let it stand a while, it will not work at all. I take out the carbons and zinc every time, but it won't work. Can you tell me the reason why? A. Your trouble may arise from one of several causes. Your carbon surfaces may be too small; your solution may be too weak; possibly you have not paid sufficient attention to the amalgamation of your zincs. Your binding screw connections may be imperfect. 2. I have eight permanent magnets. How can I have them remagnetized? A. You can recharge your magnets by drawing them across the poles of a strong electro-magnet, or inserting their poles in coils and sending a current through the coil.

(3804) O. C. W. asks: Does an electric car generate any current while running down a grade with the current from power plant shut out? A. It does if the motors are run in series. Thus one car going down a hill may help to pull another distant car up a hill. As on the usual system of working in parallel the circuit of the motor of an electric car is open while the car is on a down grade no current is generated. The motor is capable of generating a current when driven in the manner described.

(3805) L. K. asks: What is good to clean tombstones the quickest way, where they have been discolored by the weather? A. The tombstones that have become weatherbeaten and dusty should be thoroughly washed with soap, water and fine beach sand applied with a stiff scrubbing brush. Then if stains require to be removed, a solution of oxalic acid in water may be applied with the brush, and after standing a few hours, should be washed off with clear water. Marble can be much improved by rubbing the surface with fine sandstone. Keep oxalic acid off the hands, as it is poisonous. Or apply a mixture of ¼ lb. soft soap, ¼ lb. whiting and 1 oz. washing soda, and a small lump of copper sulphate. Leave on the marble for a day and then wash off and polish.

(3806) O. M. W. writes: 1. I would like to know what solution jewelers use in which to dip plated silverware to take off the oxidation; and how is it prepared? A. Any solution which will remove the oxidation of silver-plated ware will tend to remove the silver itself, and should therefore be used with great care. A solution of hypo-sulphite of soda will remove the tarnish; a solution of cyanide of potassium is more efficient, but exceedingly poisonous, and should be used with great care. 2. I have a medal about the size of a $5 gold piece, but lighter gold color, having on one side a head of Queen Victoria and "Victoria Regina, 1837;" on the other, "To Hanover," with a king on horseback and a dragon underneath. It is in good preservation. Is it of any value? A. In regard to the value of your medal, we advise you to write to some reliable numismatist.

(3807) P. K. asks: Is there any good and practical method known to make drawings on paper temporarily translucent, in order to take blue copies directly therefrom, kind of blue print paper mounted on cloth which answers well for use as working drawing. It would save much time if the original drawing could at once be rendered translucent and fit for blue copying. The generally used transparent paper or cloth is unfit for original drawings, as it soon gets dirty, and does not permit the use of India rubber. A. Drawings made on cardboard drawing paper are made temporarily translucent by flooding the paper with purified benzine. The latter must be of the best quality. This liquid soon evaporates without injuring the drawing. While in the translucent state, the blue print may be taken.

(3808) E. B. K. asks: 1. In the analysis of illuminating water gas, to get at the per cent of hydrogen and marsh gas, by burning with pure oxygen through heated platinum tube, what amount of oxygen should be admitted to burette for burning the H and CH_4 (say the analysis showed 1·8 CO_2; 15·8 of CH_4; 2·4 of O; 29 of CO; having a volume of 51 per cent in burette). A. Enough oxygen must be added to completely burn all the marsh gas and hydrogen present. If it were pure marsh gas, then 51 cubic centimeters would require 102 cubic centimeters of oxygen. If it were pure hydrogen, then 26 cubic centimeters would suffice. If no nitrogen is present, simply add a good excess of oxygen, as any excess, within reasonable limits, does no harm. If nitrogen is present, the combustion can be effected with pure air, as oxygen combustion in the presence of small quantities of nitrogen is liable to give oxidation products of nitrogen, which would invalidate the analysis. 2. Also what is the rule for calculating height of barometer from certain heights above sea level? A. La Place's barometric formula is X (height in feet) $= 60{,}346\ (1 + 0{\cdot}00256 \cos \phi)\left(1 + \frac{2\,T + T'}{1{,}000}\right) \log \frac{H}{H'}$ In this T indicates temperature at the upper station and T′ temperature at the lower station in degrees Centigrade. H and H′ denote the height of the barometer in inches at upper and lower stations respectively reduced to 0° C. To effect the last reduction, apply the formula $H = h\left(1 - \frac{t°}{6{,}500}\right)$ in which h is the observed height and $t°$ the temperature in degrees Centigrade. For heights under 2,000 feet the following formula may be used:

$$X = 52{,}500\left(1 - \frac{2\,(T + T')}{1{,}000}\right) \times \frac{H - H'}{H + H'}$$

(3809) E. C. L. asks what is used to give the luster to artificial diamonds, and how is it made? A. They are sometimes backed with bright foil or with mercury or looking glass or amalgam. See queries 3717 and 3793. Foils are described in the "Techno-Chemical Receipt Book," $2 by mail.

(3810) W. M. asks (1) how to make aldehyde-ammonia. A. Evolve ammoniacal gas in any convenient way, such as treatment of ammonium sulphate dissolved in water, with caustic soda or potash. This should be done in a flask or retort. The gas evolved is dried by bubbling it through concentrated sulphuric acid, or by passing it over dry calcium chloride. It is then passed into a solution of aldehyde in ether. The aldehyde-ammonia will crystallize in large rhombohedrons. 2. How to make crystallized nitrate of silver. A. Dissolve silver in as little nitric acid as possible and evaporate, best on a water bath, until it crystallizes. If the silver is not pure, the crystals should be fused at a gentle heat until quite liquid, and then redissolved, exposed to the sun for a day, filtered, and recrystallized.

(3811) W. E. B. says: The recent severe gale started in Texas and moved northeast into Canada. Why was it not accompanied by northeast winds, the same as when a storm starts in the Gulf of Mexico, and moves up the Atlantic coast? A. The great storms that come up the eastern coast of the United States are generally of the cyclone type and have their origin in the tropics. The winds on the northerly side of this class generally blow from the northeast. The storms that are generated in the southwestern States are often of the same order, and have their northwest winds in the Western States, while the Atlantic States will have easterly to southeasterly winds, the winds on the opposite sides of a great storm of this type generally blowing in opposite directions. 2. Will the wet and dry bulb thermometers work when placed inside, so that you can depend upon their readings? A. The wet bulb (Mason's) hygrometer must have a good exposure to the outside air and shaded from the sun and wind. It will not give reliable results inside of a house. 3. I have a record of my mercury barometer falling to 29·32 on June 16, 1891, and the thermometer was 92. Why did it fall so low when no storm appeared? A. A considerable fall of the barometer without a storm is a frequent occurrence. There are dry storm waves, the moisture of the atmosphere being too far below the point of saturation to produce rain or snow by the change in pressure. High temperature also increases the hygrometric capacity of the air, which may prevent rain during a barometric depression.

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(3812) "Unscientific American" says: Will you please state in your paper the difference between a copper flue, copper pipe, copper tube? A. The only difference is in their use, each kind being made for a special line of trade. Copper flues are made of sizes and thickness for boiler flues and designated by their outside diameter. Copper pipe is made to the outside gauge of iron pipe and thick enough to take iron pipe threads and designated by the nominal inside diameter. Copper tubes and tubing embrace a great variety of sizes and thicknesses usual in trade and generally designated by their outside diameter.

(3813) G. A. R. writes: A man has been working at electrotyping during the past three years; he handles considerable plumbago, bluestone, and iron rust, the bluestone being a solution in water. His hands are black and have been so for years. Can you give me a receipt for something that will clean them? A. Possibly some modification of a tattoo removing process might be applicable. Such is described in our SUPPLEMENT, Nos. 695 and 722. There is always danger to be apprehended in severe treatment applied to such large areas of skin surface.

(3814) G. B. M. asks what rule to use to wind a dynamo to obtain a certain number of volts and amperes. How to wind a motor to obtain the best results from a given number of volts and amperes, as six volts twelve amperes, twelve volts six amperes. Is four volts eight amperes as useful for power, as, eight volts four amperes? How many amperes can be safely carried through No. 14, 16, 18, 20 respectively? A. As the length of wire on the armature is mainly concerned controlling in the generation of the current, the first question to be settled in planning a dynamo is the voltage of the current to be generated. In the best dynamos two feet of active wire are allowed per volt. Having determined the amount of wire required for the armature to produce the specified voltage, the next question to be determined is that of the current. The wire selected must be of sufficient size to carry the current without being unduly heated. The next step is to plan the armature, which must be of sufficient length and diameter to hold the wire. It is desirable to limit the depth of the winding so that the iron core of the armature shall not be too far from the polar extremities of the field magnet. The winding should be divided up into as many coils as convenient. After having constructed the armature with a suitable commutator, the iron part of the field magnet should be made in such a manner as to inclose the armature, leaving air spaces between the poles equal to about one-third the diameter of the armature. The field magnet should be constructed so as to permit of using interchangeable coils. For a shunt machine the field magnet should have about fourteen times the resistance of the armature. The amperage of a machine is determined by dividing the E.M.F. by the resistance. It will therefore be seen that if a large current is required, the resistance of the machine must be very low. In designing a motor, the same general rules should be followed, and the total resistance of the machine required to secure a certain power from a given current is determined by Ohm's law, the basis of the calculation being that it requires 746 watts for a horse power, a watt being a volt multiplied into an ampere. It is impossible within the limits of an ordinary reply in Notes and Queries to furnish you with the full information desired. We therefore refer you to Sloane's "Arithmetic of Electricity," $1; Hering's "Dynamo Electric Machines," price $2.50; Hering's "Magnet Winding," price $1.25; and "The Electromagnet," by Silvanus P. Thompson, price $6, all of which we can send you by mail. Nos. 14, 16, 18, and 20 copper wire would carry respectively 6·4, 4, 2·5 and 1·6 amperes.

(3815) M. H. C. asks: 1. Is the current from a primary cell proportional to the surface of the elements exposed to the solution? A. Nearly. 2. In a carbon zinc cell, why is the exposed surface of the carbon so in excess to that of the zinc? A. Depolarization of a battery depends to a large extent upon the carbon surface. If it is large in proportion to the size of the zinc, it is more effective than it is when smaller. 3. Are electric street trailers ever lighted by an incandescent system connected with the circuit of the motor? A. It is common to light electric street cars by the current derived from the power system. We do not know that the light has ever been applied to the trailer. 4. What causes the armature (of a dynamo) to require more power in turning than a fly wheel of the same weight? A. The turning of any conductor in a magnetic field is always at the expense of considerable energy.

(3816) G. F. A. asks: 1. How long does it take to make the vacuum in the incandeseent electric lamps? A. From one to several hours. 2. Does the air pump which is used for this purpose cost a great deal more than a good piston air pump? A. A Geisler or Sprengel air pump costs about $50. 3. Is there any difference between an air pump and a vacuum pump? A. No. 4. What is the ratio of relative brightness used in classifying the stars into their different magnitudes? A. The accepted light ratio of star magnitudes is 2·512 and 0·3981—*i. e.*, a star of the first magnitude is 2·512 times greater than a star of the second magnitude, and a star of the second magnitude is 0·3981 the light ratio of one of the first magnitude, and so on through the series.

(3817) M. R. asks: 1. Can refuse arc light carbons be used in place of square carbons in a battery, and does a rod with the same amount of surface exposed as a square carbon give the same intensity of current? Also tell me how to fasten same to a brass connection post. A. Electric light carbons may be used in a battery, but if they are coppered, the copper must be removed. This can be done by dipping them in nitric acid. After this treatment the carbons should be thoroughly washed and dried, and about one inch of one end of each rod should be heated and soaked with paraffin. These ends can now be electroplated with copper and soldered to the wire connections, or they may be soldered together side by side or fastened together by means of lead cast around their upper ends. The round rod is an excellent form for the purpose. 2. Tell me how to make a white ink to write on a dark background. A. For white ink use barytes or Chinese white and a little gum water. 3. Tell me in what number of the SCIENTIFIC AMERICAN or SUPPLEMENT I can find directions for making a common plunge battery with glass or wooden cells. A. You will find a large plunging battery described in SUPPLEMENT, No. 792. 4. Please tell me what elements were discovered since 1886 and who are the discoverers? A. None have been definitely discovered and identified as elements. The work of Crookes, Von Welsbach, De Boisbaudran and others in the direction of identifying new elements have had no very definite result in the period named. Norwegium, holmium, thulium and many doubtful oxides from the minerals samarskite, gadolinite, etc., cannot be allowed to figure as authentic discoveries of elements. There are still left about twenty blanks in Mendelejeff's table to be filled possibly by newly discovered elements.

(3818) M. E. W. writes: I am thinking of being an electrician. What is the salary of an electrician? What is his work? Does he have to go to college or can he not study as an apprentice? What would be the best studies to take while at school? A. The salaries of electricians vary from $4 to $40 a week. The work required of him is according to his ability. Some parties who only run electric lines call themselves electricians. Others are able to go into the most intricate calculations. If you expect to be an electrician and not an electrical engineer, you can probably gain the necessary knowledge by studying as an apprentice. At school you should study mathematics, physics and chemistry, and if there is a course in electricity, obviously you should take that.

(3819) E. F. B. asks what the surface maasure would be to 1,000 feet elevation, also what the elevation would be to 79 miles surface measure for vision. A. In round numbers the possible range of vision for an observer 1,000 feet elevation for an object on the surface of the earth, and allowing for refraction, is 48 miles. For 79 miles range the necessary elevation, allowing for refraction, is 2,680 feet. Not allowing for refraction, for 1,000 feet elevation we have a range of 44½ miles, and for 79 miles a necessary elevation of 3,180 feet. All this applies to objects on the surface, and is of course subject to limitations of eyesight, clearness of atmosphere, power of telescope, etc.

(3820) F. C. G.—To remove fruit stains from table linen moisten with dilute sulphuric acid and then rub with aqueous solution of sulphite or hyposulphite of soda in water.

(3821) Index.—In regard to the solidification of potatoes the process is not patented and is said to be as follows: Make a solution of 4 parts of sulphuric acid in 50 parts of water. Treat peeled potatoes with this solution for thirty-six hours. Dry the mass between blotting paper and subject to great pressure. By using very strong pressure, billiard balls have been made closely resembling ivory. The material can be carved and doubtless could be used for the larger types. We have had no practical experience with this receipt or the substance described.

(3822) W. B. S. asks for the voltage and resistance of a Fuller battery, and how many cells would be required to light a two candle incandescent lamp, a three candle and four candle. A. The voltage is about 1·90 when in good condition. The resistance will depend on size; ½ ohm would be a fair average. Allow one cell to a candle power.

(3823) W. E. S. says: Three men are to lift a timber 18 feet long, weighing 200 pounds, and each to sustain one-third the weight. One to lift from the end and the two others to support their end by means of a cross bar. How far from the end must the two men place the cross bar to bear two-thirds the weight? A. The cross bar should be placed 4½ feet from the end of the timber for three men to carry it with even load.

(3824) J. K. asks how to solder metal to glass. A. We give you the following from the "Scientific American Cyclopedia of Receipts, Notes and Queries:" "Cover the glass with a thin layer of platinum, by brushing a neutral chloride of platinum mixed with essential oil of camomile. The oil is slowly evaporated by heat, and when the vapor ceases to be given off, the temperature of the glass is raised to a red heat. This reduces the platinum salt to a metallic state. The platinum thus attached to the glass is electroplated with copper. The article to be attached can be secured by electro soldering, or by means of soft solder applied in the usual way to the coppered glass."

(3825) J. L. says: 1. Lately I was vulcanizing India rubber in a Hay's vulcanizer. The safety point is about 320° temperature, but it got up to about 390. I immediately shut off the gas and opened the window, when somebody said that it would be dangerous to do so. Now, would the act of raising that window have any effect upon the vulcanizer or the contents? A. We can see no danger in opening the window under the circumstances stated, and only a cooling effect. 2. What is the cause of the bursting of an emery wheel? A. The bursting of emery wheels may be from defects, as a flaw or a crack unnoticed on the outside, or from too great speed. 3. Do you think that a small drill could be operated by springs, they (springs) furnishing the power. Could you give any hints as to how it could be done? A. Spring motors are practicable for small drills. See SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 46, 47, 48, 50, 473, for illustrated descriptions of spring motors.

(3826) L. A., Jr., asks: 1. What is the best dressing for leather belts to prevent slipping? Rubber belts the same? A. Rub a little beeswax on the inside of leather or rubber belts, to make them stick. This does not injure the material. 2. How much heat may be obtained by placing 1,000 ft. of one inch steam pipes, charged with 80 lb. steam pressnre, in the basement of a 16 ft. square kiln? A. You should be able to obtain from 150° to 200°, according to construction and closeness of the room. 3. Is not mutton tallow and cut rubber mixed a good leather boot waterproofing? What can you recommend? A. You will find your mixture to stiff and difficult to mix. Try 1 oz. beeswax, ½ oz. suet, 2 oz. olive oil.

(3827) E. A. D. asks: What is the so-called "photographic process" of printing? For instance: I heard a bookseller remark to a purchaser: "This book is not as clearly printed as the original, for it was printed by the photographic process." A. The bookseller probably meant that the book was made from copied printing plates produced by the photographic process. Of each printed page of the book to be copied, a photo-negative is made. A photo print from the negative is made on sheet zinc. This is etched with acid, which eats out all the parts of the plate except the printed letters and lines, thus producing a printing plate without the need of setting types. Books are copied in this way.

(3828) G. H. asks: 1. How can meerschaum be colored artificially? A. Fill the pipe and smoke down about one-third, or to the height you wish to color, leaving the remainder of the tobacco in the pipe undisturbed for several weeks, or until the desired color is obtained. When smoking, put fresh tobacco on top and smoke to the same level. 2. Have there ever been "professional fasters" in any other country than America? A. As human nature is pretty nearly the same the world over, we think you will find cranks of the class named in every country under the sun. 3. Where does the water exert the greatest pressure against the sides of a moving vessel (steam boat)—at the bow or at the stern? A. At the bow.

(3829) A. McB. asks: 1. What proportion should the resistance of the field magnets be to that of the armature of a motor in order to secure the best results? A. In the shunt machine the resistance of the field magnet should be about fourteen times that of the armature. 2. Is the resistance of a drum armature one-half or one-quarter of the original resistance of the wire? A. One-quarter. 3. Are there any other numbers of the SCIENTIFIC AMERICAN or SUPPLEMENT that have anything in them about photo-engraving, besides SUPPLEMENT, No. 612? If so, give me numbers please? A. You will find photography and photo-lithography described in SUPPLEMENT, Nos. 656, 603, 642, 501, and 749.

(3830) A. D. B. writes: In the gas engine, the charge is taken in before compressing fills the same space in which it expands. What I wish to find out is this: Would I derive any more power from the same amount of gas (compressed just the same as in the first illustration) if allowed to expand to say one-half greater volume than in the first case. That is to say, if I increase the length of stroke one-half, leaving the volume of gas the same with the same compression, how much, if any, would I gain in power? And how far could I carry that principle in practice? A. If the gas engine utilizes the pressure exerted by the expanding gases to such an extent as to reduce the pressure at the point of exhaust to such a degree that it would be no longer available in driving the piston, it is obvious that an increase of stroke would not increase the efficiency of the engine; but if, on the other hand, the exhaust takes place while the pressure is still great in the cylinder, an increase in the stroke would be beneficial.

(3831) D. McN. asks how to waterproof cloth without using rubber? A. Soak the clothing in a weak solution of alum; afterward immerse it in strong soapsuds; then rinse it in clear water and dry.

(3832) H. B. D. asks: How can I ebonize a piece of white holly for inlaid work? A. Steep the wood in strong liquor of logwood or galls; let it dry and wash it over with a solution of iron sulphate. Wash with clean water and repeat if the color is not dark enough.

(3833) A. M. asks: 1. How can I give to steel the right degree of hardness for permanent magnets? A. Heat the magnets to a low red; plunge them in water and draw the temper to a straw color. 2. How are the Burnley dry cells made? A. To secure the details of this battery, you should purchase a copy of the patent in which it is described. 3. What size of platinum wire will become red hot with current from three cells of battery? A. It depends upon the amount of current generated by the battery. Usually very fine wire, either No. 34 or No. 36, is used. 4. How can I make a galvanic battery in which there will be no chemical action except when the circuit is closed? A. There is very little action in the Leclanche battery when the circuit is open. You will find this battery described in SUPPLEMENT, No. 157.

(3834) C. M. M. asks: 1. Whether hydrogen gas has been introduced for purpose of domestic heating? A. It has not, owing to the expense of generating it. The nearest approach is the Dabereiner lamp, introduced early in the century to do what matches do now. 2. If no such apparatus is known in the trade, what kind of gas has been found most practicable for use in private houses out of town? A. Gasoline gas, made by passing air over the surface of gasoline.

(3835) G. R. F. asks what to use, as of a kind of varnish, to put on a rubber hose used for gas, to prevent the smell of gas which comes from it, I think, through the pores of the said rubber hose? A. Try shellac varnish applied to the interior. A good hose should be practically gas tight. A solution of shellac in strong ammonia water is one of the regular varnishes for india rubber goods.

(3836) F. Z. C. writes: I have tried to recharge a porous cup of Leclanche battery in the following way, but cannot get a current, although set up the same as a new cup. Bits of carbon from electric light lamp and powdered black oxide of manganese nearly equal parts. Where is the trouble? Is it because I did not use the graunlated manganese? Please locate fault. A. We can see no reason why you did not succeed with your battery. Possibly you failed to wet the carbon and manganese mixture in the porous cell before trying to start the battery. You may have sealed the porous cell so that the air cannot escape to permit the solution to enter. There should always be one or two air holes in the sealing at the top of the cell.

(3837) E. N. asks: Can you inform me how to make an emulsion of cod liver oil? A. Take 8 oz. cod liver oil; 2 oz. gum arabic in powder; 3 oz. water. Rub up the oil and gum, and then add the water. Of this concentrated emulsion take 13 oz.; oil of wintergreen, 24 drops; simple sirup, 1 fl. oz.; water 3 fl. oz. Triturate the concentrated emulsion and oil of wintergreen together, and then add the water and then the sirup. Other formulas are given in the "Scientific American Cyclopedia of Receipts."

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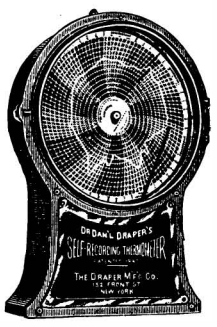

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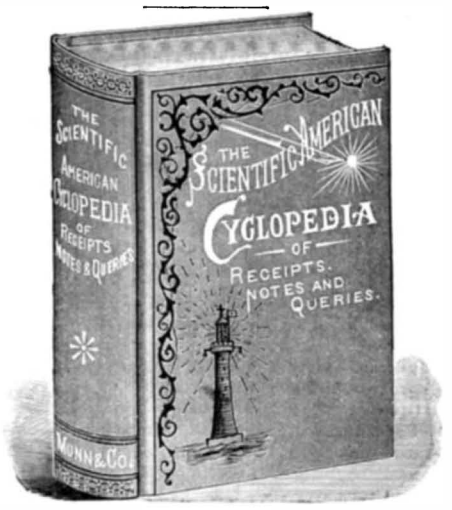

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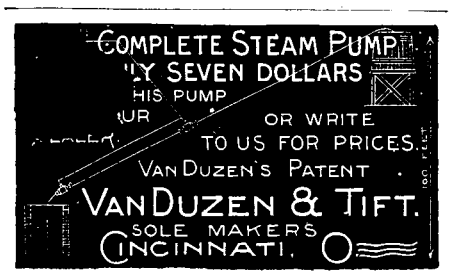

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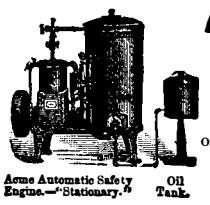

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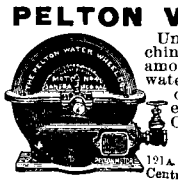

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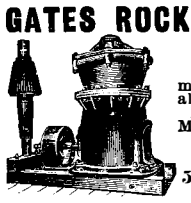

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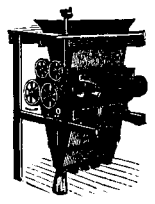

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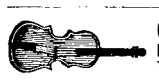

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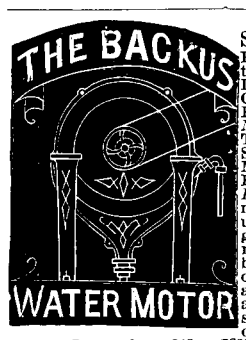

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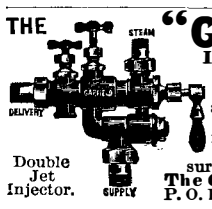

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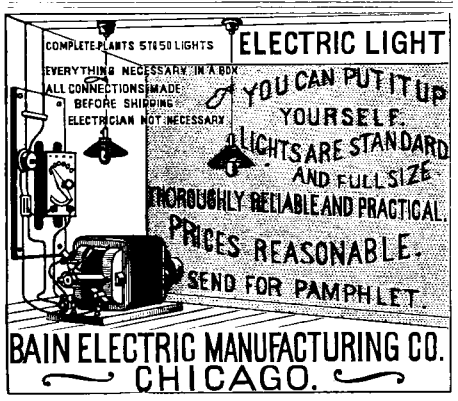

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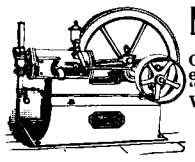
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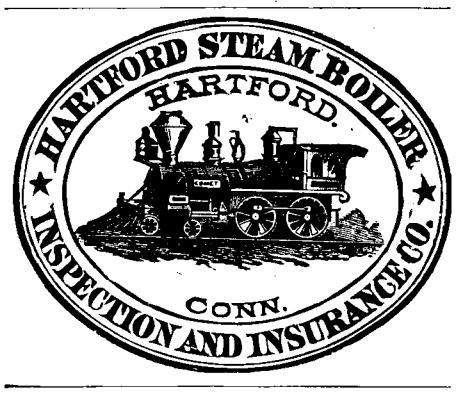

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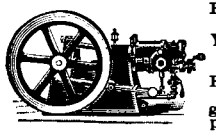
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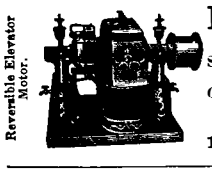

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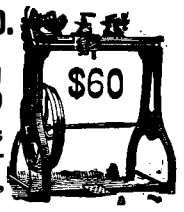

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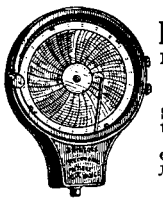
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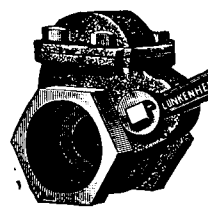

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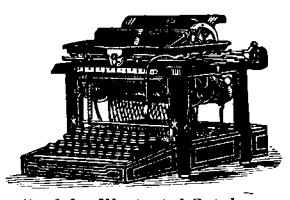
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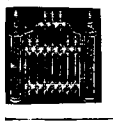
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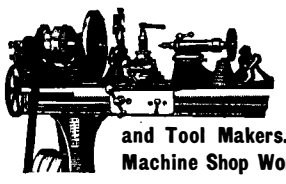
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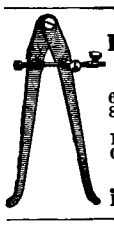
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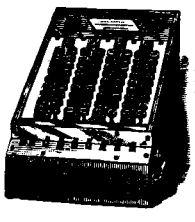
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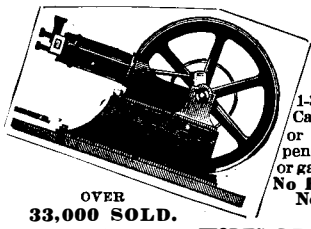
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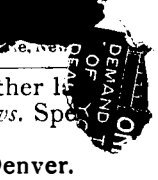

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